

The AMSAT[®] Journal



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Volume 32, Number 3

May/June 2009



**Owen (c) and Richard Garriott (l)
with Gould Smith (r) - A significant
highlight at Dayton!**



Truckin' with the Sats

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Technical papers are solicited for presentation at the 28th Annual ARRL and TAPR Digital Communications Conference to be held September 25-27, 2009 in Chicago, Illinois. These papers will also be published in the Conference Proceedings (you do NOT need to attend the conference to have your paper included in the Proceedings). The submission deadline is July 31, 2009. Please send papers to:

Maty Weinberg
ARRL
225 Main St
Newington, CT 06111

Or, you can make your submission via e-mail to: maty@arrl.org.

Papers will be published exactly as submitted and authors will retain all rights.

73,
Steve, WB8IMY
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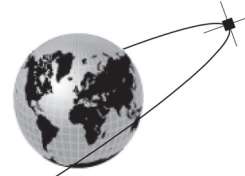
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AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow Amateur Radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

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Our Vision is to deploy satellite systems with the goal of providing wide-area and continuous coverage. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.





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The AMSAT Journal (ISSN: 1407-3076) is published bi-monthly (Jan/Feb, Mar/Apr, May/Jun, Jul/Aug, Sep/Oct, Nov/Dec) by AMSAT-NA, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703. Telephone: 301-589-6062, fax: 301-608-3410. Periodicals postage paid at Silver Spring, MD and additional mailing offices.

Postmaster: Send address changes to *The AMSAT Journal*, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703.

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I'm writing this column in late May after just arriving home from a 10-day trip to Ohio. The primary purpose for driving out to Ohio from New England was to assist with the AMSAT booth at the Dayton Hamvention. From everything that I saw, Hamvention was very successful from an AMSAT perspective as well as from the perspective of Hamvention organizers, vendors and the attendees. The weather cooperated, attendance was higher than many expected and people appeared to be spending money. [I sure did! – Ed.]

Hamvention plays an important role for AMSAT in communicating with not only our membership but with outside organizations as well. The AMSAT booth and the AMSAT Forum serves as our 'stage' in terms of informing Hamvention attendees of what AMSAT is doing. It also serves as a magnet for attracting our members and others to get the latest information about AMSAT and to establish links with other groups. Further, it is a great opportunity to see old friends and meet new ones. Many of our members use Hamvention as a time to renew their membership as well as their acquaintances.

The AMSAT booth this year highlighted two themes: 1) The 40th Anniversary of our organization and 2) the development of SuitSat-2. Gould Smith, WA4SXM, redesigned the booth layout to take full advantage of highlighting these two topics. First, the SuitSat-2 team delivered a prototype 'demonstration' that gave attendees a good idea of the potential for this new technology development. I will leave it to others in this issue to provide the technical details of what was shown. What I was pleased to see (and hear) was that the prototype simultaneously transmitted three signals at the same time: 1) A telemetry beacon, 2) A 'canned message' FM downlink recorded by various students in different languages and SSTV and 3) a CW transmission. These signals were then received by various receivers in the booth so that visitors could hear what was being sent as well as see the transmission patterns on a 'pan display' running on a laptop that was receiving input from a SDR radio provided by Drew Glasbrenner, KO4MA. Further, the SuitSat-2 equipment was on display, including showing how various equipment will be mounted on a spacesuit helmet as well as being able to see the various boards that make up the 'stack'. Overall, this was a very effective demonstration of where

things stand with SuitSat-2. The SuitSat-2 Team is now working hard to be in position to complete the project and ship the flight hardware to Russia by mid-September.

The 40th Anniversary display featured numerous magazine covers from various Amateur Radio magazines that highlighted various AMSAT accomplishments over the years as well as SAREX and ARISS achievements. There were also a number of AMSAT 'artifacts' on display. We intend to highlight our 40th Anniversary at the upcoming AMSAT Symposium that will take place at the BWI Sheraton 9-11 October 09.

The joint AMSAT-TAPR banquet Friday evening was a huge success with a sold-out crowd of over 180 AMSAT and TAPR members that enjoyed an outstanding presentation by Richard Garriott, W5KWQ, who is the 2009 Hamvention 'Special Achievement Award Winner. Both Richard and his father, Owen, W5LFL, were guests of AMSAT and the ARRL at Hamvention and both individuals took time to meet and greet people at the AMSAT booth. Richard is the 6th private citizen to visit the International Space Station and his flight in October 2008 took place around the time of the 25th anniversary of Owen's historic flight on STS-9 in 1983 when the first Amateur Radio transmissions took place from the Space Shuttle.

One person that I was very happy to see at the Banquet was TAPR President Dave Toth, VE3GYQ/W8, who had major surgery in March and is still recovering. While Dave is not currently in position to resume his presidential duties, the fact that he made the effort to come down from Lima, OH to attend the dinner and say hello to his TAPR and AMSAT colleagues was a very pleasant surprise. We wish Dave a speedy recovery.

The AMSAT Forum on Saturday morning drew a record crowd to hear Richard Garriott's brief remarks followed by presentations by WD4ASW, WA4SXM, KO4MA, KC6ROL and W5DID. What was impressive was that while Richard Garriott, W5KWQ, was perhaps the 'draw', those that came to the Forum stayed to hear the other

continued on page 27 ...



SuitSat-2 Update

Gould Smith, WA4SXM, wa4sxm@amsat.org

SuitSat-2 Systems Engineering

SuitSat-2 is an enhanced follow up to the 2006 SuitSat-1 satellite. We will have solar panels, battery charging, experiment(s), four video cameras and a software defined radio system providing CW, SSB and FM signals as well as a transponder. We anticipate operation for six plus months after release. See the block diagram in Figure 1.

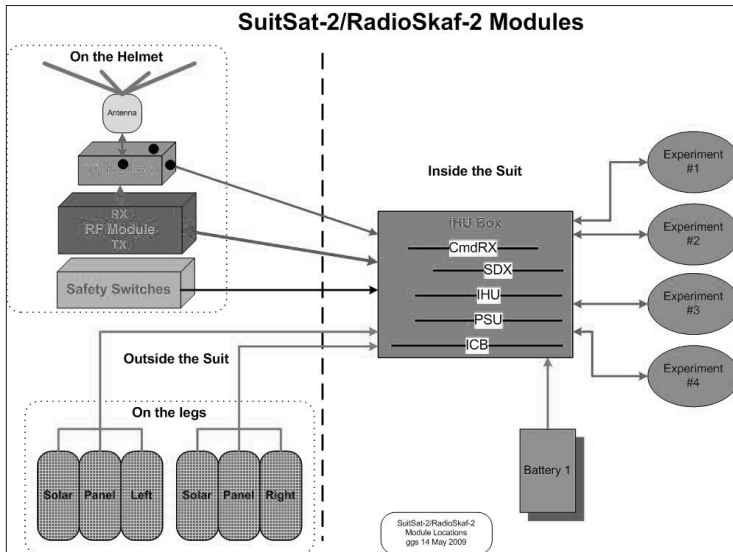


Figure 1: SuitSat-2 block diagram.

Dayton Milestone

The SuitSat team used the Dayton Hamvention as a major milestone to show off our progress in developing this innovative system. The hardware in this modular concept can be used as is or easily adapted to many other Amateur Radio projects using the core components. We are working toward a September 2009 delivery to Russia, a late 2009 ride to the ISS (International Space Station) and a first quarter 2010 release into space. Kursk University and the Russian team members will be providing a new Silver Oxide battery, an experiment, qualification of the system and most importantly transportation to the ISS. Frank Bauer, KA3HDO, Mark Steiner, K3MS, and Will Marchant, KC6ROL, continue to be instrumental in making this project a reality.

The development is going on in many parts of the United States, and we coordinate using e-mail and weekly teleconferences. Lou McFadin, W5DID, the ARISS US Hardware Manager, is overseeing the original design requirements, the antenna, interfacing with ARISS, the enclosures (with Jim McGuire, KB3MPL, and Joe Julicher, N9WXU),

cables (with Larry Brown, W7LB) and instructing us about requirements for NASA and Russian qualification. The team will also be gaining some experience in getting an export license.

The SuitSat-2 demonstration system at Dayton was the first time we were able to cable all of these modules together at the same time. We are now working toward having four

complete systems at four different locations for final development and testing. The next major milestone is the Phoenix IV meeting in early July to test these integrated systems. The Dayton system was on display in the Engineering Area of the AMSAT booth. The demonstration attracted a great deal of interest and

a number of the team members were there to explain the operation of the system. We generated signals using the development hardware and had a complete ground station

system receiving and displaying the signals generated from the SuitSat-2 hardware/software.

Demonstration Setup

You can match the actual demonstration setup in Figure 2 to the block diagram in Figure 1. Starting in the lower left of Figure 2 you can see one of the two solar panel cables (each cable with three solar panel connectors) attached to the IHU stack enclosure. The IHU stack enclosure contains the power system circuits, the computer, the software defined radio board and a large interconnecting board that has most of the signals brought out to the edges for test and development. On top of the model helmet are the safety switches with LEDs and the RF stack containing the 500 mW, 2m transmitter, 70cm receiver enclosure, video enclosure with four cameras and 2m and 70cm antenna. An experiment display is shown on the right hand side of the photograph. At Dayton I attached a Netbook running a terminal program to the IHU serial debug output to show the debug messages and system operation (far left of Figure 2).

IHU Stack

The IHU stack in the enclosure is composed of four boards:

- 1) The ICB (InterConnect Board – Joe Julicher, N9WXU, and Jerry Zdenek,



Figure 2: Dayton SuitSat-2 demonstration system.



Figure 3: IHU stack.

- N9YTK)
- 2) The PSU (Power Supply Unit – John Charais and Zeke Lundstrum)
 - 3) The IHU (Integrated Housekeeping Unit – system control - Joe Julicher, N9WXU; Jerry Zdenek, N9YTK; Steve Bible, N7HPR)
 - 4) The SDX (Software Defined Transponder - [hardware] Steve Bible, N7HPR;

[software] Tony Monteiro, AA2TX; Jim Johns, KA0IQT; Bill Reed, NX5R, and Joe Fitzgerald, KM1P).

Jerry Zdenek, N9YTK, has developed a CPLD [*Complex Programmable Logic Device - Ed.*] that is on the IHU board that will take the composite video from the four cameras and will determine if there are enough illuminated pixels in an image to possibly make a reasonable picture, then

converts this to Robot-36 format and sends it to the SDX where it is sent out on the FM signal.

The IHU enclosure has connections to:

- 1) The battery (connector at the rear of the photograph)
- 2) The solar panels (2 connectors on the front left)
- 3) Four experiments (4 connectors on the front right)
- 4) The 50 pin cable connecting the IHU stack to the RF stack on the helmet.

The 50 pin cable carries the 10.7 MHz signals to the TX unit and from the RX unit, composite video from the four cameras, power, telemetry data, command channel data and control signals from the switches. There will also be part of the command receiver in the IHU stack enclosure. John Klingelhoetter, WB4LNM, has recently joined the team to help bring the command receiver along. The command receiver is to comply with IARU requirements to provide a means to shut off the transmitter in case of interference. Depending upon time constraints, we may add additional commands. Tim Moffat has soldered thousands of connections and prepared the IHU stack boards used in all of the development efforts. Tim also has setup a SuitSat-2 Web site that will contain additional information to as we have time. Find it at suitsat2.org.

SuitSat-2 RF Stack

Jerry Zdenek, N9YTK, has enhanced the safety switch circuit that prevents any transmissions from SuitSat-2 until 15 minutes after the three switches are thrown. These changes were needed to incorporate the command receiver. Lou, W5DID, and Stan Wood, WA4NFY, designed the 2m/70cm antenna that sits atop the RF stack. The stack and safety switches are mounted to the helmet of the Russian Orlan space suit. Bill Ress, N6GHZ, has redesigned the SuitSat-2 transmitter to be more efficient. We used his TX prototype for the display, but he has a new TX board that we will be replicating soon and distributing to various teams. Bill is also making some modifications to the receiver circuit that Ivan Gaylsh, KD4HBO, designed and will have these available soon to mate with the command receiver and transponder.

Experiment

SuitSat-2 has provisions for four experiments

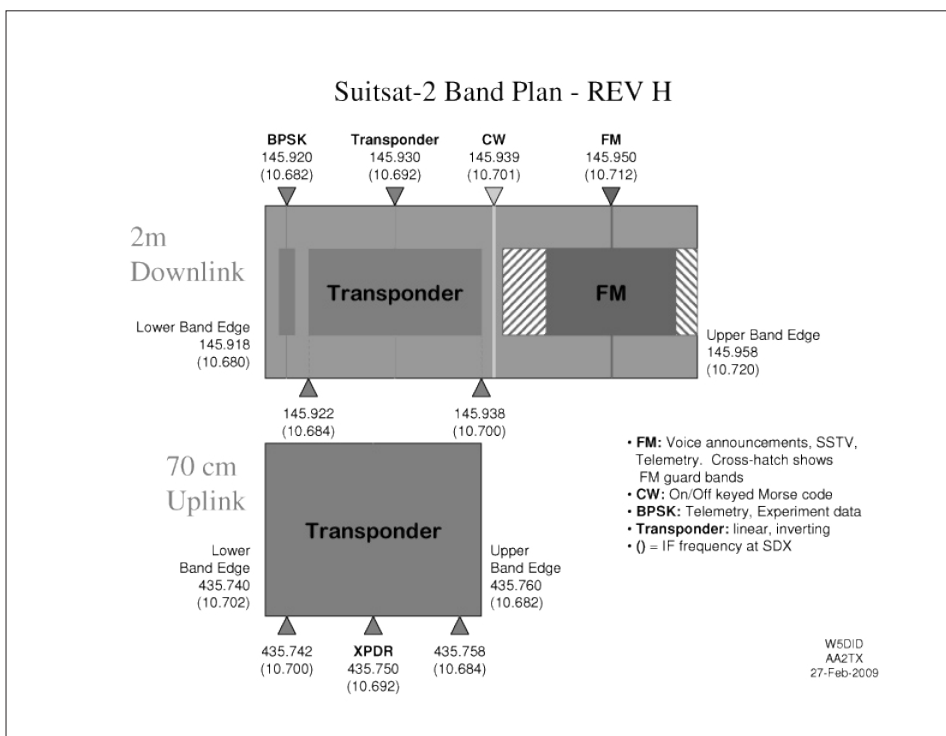


Figure 4: SuitSat-2 band plan.



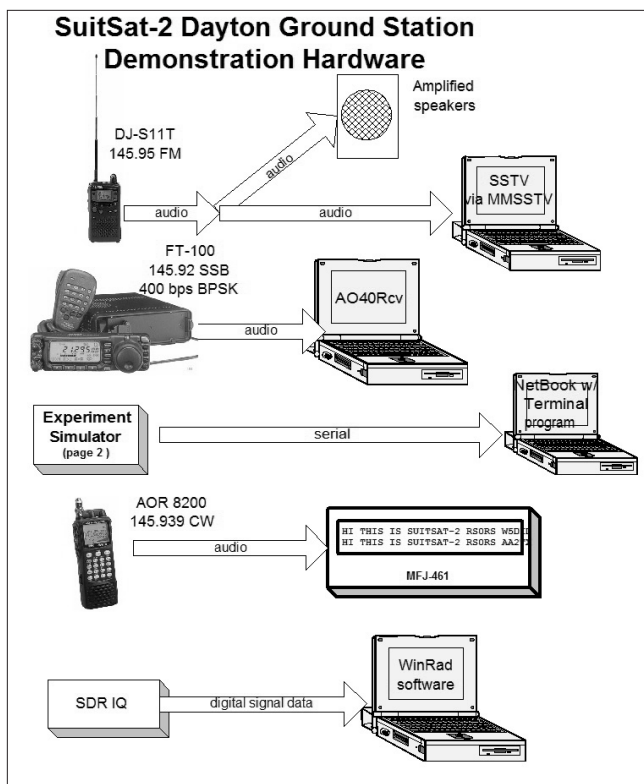


Figure 5: SuitSat-2 demonstration ground station.

and we are looking at perhaps increasing this on future missions. Steve Porter, KE7URR, has designed an Experiment Simulator board that will act as the IHU would and power the experiment at periodic intervals and then

- FM
- CW
- BPSK
- Transponder



Figure 6: SuitSat-2 receive system with Bill Reed, NX5R, smiling about the system he helped develop.

download the data. Steve also added an RS-232 port that sends the data out over this link to a terminal/computer to check experimental

The main signal is an FM transmission designed to send a Voice ID of the satellite (audio editing Dave Jordan, AA4KN),

data. The unit on display at Dayton consisted of an experiment board with light and temperature sensors. You would press a button next to one of the four experiment ports on the simulator and it would power the experiment for 10 seconds and send the data back. We displayed this exchange using a computer running a terminal program. Kursk University has developed a interesting experiment that will fly on SuitSat-2 to measure the pressure changes as the satellite orbit degrades into the earth.

SuitSat-2 Band Plan

SuitSat-2 will transmit four types of signals in a 40 kHz wide transmission on 2 meters, see Figure 4. Those signals are:

international voice greetings from children, a SSTV signal of pictures taken from the SuitSat-2 cameras (Jerry Zdenek, N9YTK) and 1200 bps AX.25 telemetry data (Enrique Aleman, KE7NNT). The CW signal will transmit an ID and callsigns of people instrumental in the ARISS program over the years. Lou, W5DID, envisions a contest to see who can copy the most complete list of the CW transmitted callsigns. The BPSK signal is expected to use a new encoding scheme developed by Phil Karn, KA9Q. Douglas Quagliana, KA2UPW, is developing the ground station code segment. This signal is expected to be copied with great accuracy using a minimal ground station. Both the experiment data and telemetry data will be sent on the BPSK signal. There will also be a 16 kHz wide transponder (U/V) on SuitSat-2 using a 70cm uplink and 2m downlink.

Ground Station

The demonstration ground station at Dayton used three receivers to pick up the FM, CW and BPSK signals. I am working on building a complete, portable SuitSat-2 demonstration system that will be able to showcase the project at major events. ARISS donated an FT-100 and Patrick Stoddard, WD9EWK, donated the AOR 8200. Figure 5 shows the hardware and software used in the demonstration at Dayton. Drew, KO4MA, loaned us his SDR IQ system that does an outstanding job of displaying all the signals (see Figure 6). I would like to add one of these to the demonstration system. Not only can you easily see the all the signals, but you can see the modulation changes in the FM signal and listen to all of them by clicking the cursor on one of them and setting the modulation type. An excellent tool.

At Dayton we had loudspeakers broadcasting the FM audio and SSTV signals and periodically turned on the nostalgic drone of the Phase 3 BPSK signal. This always drew a crowd. The CW signal consisted of an RS0RS ID and callsigns of SuitSat-2 team members. These were received by the AOR receiver and decoded/displayed by an MFJ CW decoder.

One of the highlights of Dayton for me was to explain the SuitSat-2 system to Owen Garriott, W5LFL. Owen was genuinely interested and asked insightful questions.

Post Dayton

We ran out of time before Dayton to get the full video system operational however, we did demo the callsign overlay in the SSTV picture. After Dayton I was able to use Lou's

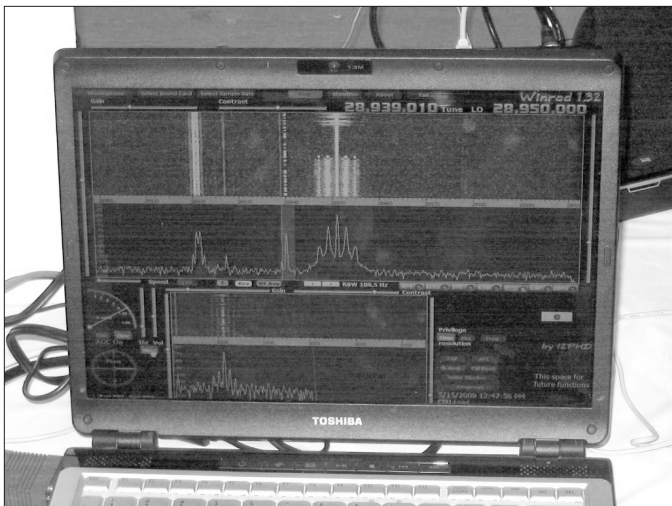


Figure 7: SuitSat-2 signals from an SDR IQ and Winrad software - left to right BPSK, CW and FM SSTV to voice transition.

video breakout cable and a number of clip leads and power the video box in the RF stack and then take the video and connect it to the 50 pin cable going to the IHU. Jerry's system worked extremely well and generated SSTV pictures from all four cameras. Figure 9 shows an actual decoded SSTV signal from the SuitSat-2 system.

The next SuitSat-2 update will focus on our integration and testing of the system.

There are many more SuitSat-2 team members making this happen as well a large group of people working on providing educational opportunities and materials for SuitSat-2 once it is about to be 'launched'. I will talk about this part of the project in a later article. 🌐



Figure 8: Gould, WA4SXM, describing the SuitSat-2 system to Owen Garriott, W5FLF.



Figure 9: Actual SSTV video capture and display using a SuitSat-2 camera.

KD4ZGW – Working the Satellites from His Office

by Tim Lilley, N3TL, n3tl@amsat.org

Many of us who work AO-27, AO-51 and SO-50 have been known to “take a break” during the work day and step outside long enough to try for some contacts during a satellite pass. Some of us work from a mobile rig. Others use a handheld station. Few of us, if any, are ever able to work the satellites FROM our offices. In that regard Rob Dunham, KD4ZGW, is different. The Pell City, AL, native routinely works the satellites from his “office” and, in the process, has been activating grids all over the U.S. for the past few months. Dunham is an over-the-road trucker and he recently rediscovered the magic of working Amateur Radio satellites.

“Dave, N4RON, was my ‘Elmer,’ Dunham said recently during a short visit home between trips along America’s interstates. “He got me into ham radio and we did a lot of homebrew projects together. He also got me interested in satellites and we worked AO-13 until it fell out of the sky.”

Licensed in the early 1990s, Dunham enjoyed our hobby immensely, until N4RON became a Silent Key. “About 18 months after I started in ham radio, Dave passed away,” he said. “It wasn’t too long after that, in 1995 or 1996, that I just dropped out of the hobby. It just wasn’t so much fun at that point.”

Dunham never gave it much thought until his FCC license came up for renewal in 2003. “I really didn’t know what to do when my license renewal was due,” he said. “I had a lot of folks encourage me to just go ahead and renew it, so I did ... and I bought a VHF radio. I’ve been active on VHF and UHF ever since.”

Those who travel the east coast – regardless of whether they’re in big trucks – likely know the town of Wytheville, Va. It’s a hub for auto and truck traffic like Atlanta’s Hartsfield-Jackson Airport is for flyers. Interstates 77 and 81 merge briefly at Wytheville. There are truck stops, restaurants, motels ... everything you’d expect to find in a spot that sees daily hoards of vehicles.

Howard “Hal” Payne, W4NP, calls Wytheville home. Dunham met him on the way through during a haul up the east coast and the two really hit it off. “Howard and I have become good friends,” Dunham said, “and he’s inspired me to start building things again. It’s bringing back a lot of great memories I



shared with Dave before he passed.”

Apparently, that inspiration to build also resurrected memories of working satellites because Dunham soon found himself interested in them again. “I wanted to see what I could do from the truck,” he said. What he’s done in a very short time, is to activate many grids from Alabama to California and back ... from his home to northeastern Pennsylvania, too ... from the cab of his 2007 Volvo VNL670.

He bought a TRAM 1180 dual-band (VHF/UHF) antenna from Mike Puckett, KI4X, who lives in the Wytheville area. His new friend Payne’s suggestions to start homebrewing again has led to more hardware hanging from his mirrors.

“I built Moxon antennas for VHF and UHF,” Dunham said, “and I have one on each mirror. I use a Yaesu FT-7800 and I have the satellite frequency pairs programmed into memories using the radio’s odd-offset feature.”

For the past few months KD4ZGW/mobile has been a regular call heard on the FM LEO satellites. Operators on any given pass don’t know where they might hear him operating from – like the relatively rare DM82, which



straddles the Texas/New Mexico border.

“I’m having a blast working the satellites and meeting people on them,” Dunham said. “And when I got to DM82 on my way back from California, I had the most wonderful time. I’ve never been on the receiving end of a pileup before. I bet that anyone who looked

toward DM82 saw the glow from my smile because I sure was grinning.”

Dunham mostly runs the east coast. His trip west was a surprise. “I checked in with the terminal on a Thursday morning and the dispatcher asked me how far west I’d be willing to go,” Dunham recalled. “I asked him what he had and he said, ‘a trip to L.A.’ I said, ‘I’ll take it!’ That was my first trip to the west coast in about 10 years.”

KD4ZGW has been driving for a living since 1998 and he’s had his radio in the truck since he picked one up after renewing his license six years ago. The events of recent months suggest that he’ll be a regular on the FM LEO satellites for a long time.

“I have already met some really great people on the satellites and I’m enjoying getting to know them and develop new friendships,” he said. One of them is John, K8YSE, who lives in EN91 near Cleveland.

“I had a satellite pass come over while I was on the road and I happened to be in a grid John needed,” Dunham said. “We started exchanging e-mails and I consider him to be an ‘Elmer’ too, when it comes to the satellites. So many people have been so friendly and helpful.”

Dunham accepts the often busy nature of passes, especially those over the eastern U.S. during after work hours. “It can turn into a real frenzy sometimes, but that’s a big part of the challenge for me. I enjoy seeing who I can have contacts with during a really busy pass.

“Because of working the satellites and the people I’ve met on them, this hobby has really come alive again for me,” Dunham said. “I’m really enjoying it. I just wish David was still around to see it.”

NOTE: You can see more of the KD4ZGW/mobile “shack” by visiting Dunham’s MySpace page at: www.myspace.com/rev_rob_dunham ☎



UPDATE – KD4ZGW Adds APRS Tracking, Going for VUCCr

Since writing the original feature on Rob Dunham, KD4ZGW, and his “Volvo Satellite Station,” I’ve had a chance to meet Dunham in person. He’s also had eyeball QSOs with Art, K4YYL; John, K8YSE; and Rick, WA4NVM. Among the notable additions to his mobile station are an ARR preamp and an automatic APRS tracking system. “My stepfather follows me on the Web,” Dunham said, “and he’s fascinated by the technology. I really appreciate K8YSE helping me with this.”

If you’re interested in getting an idea of where you might hear KD4ZGW/M operating on the next satellite pass, go to <http://apris.fi> and enter KD4ZGW-9. You’ll get real-time information on Dunham’s travels, which could help you get that grid square or state you want to log. Dunham also is looking for grids because he’s out to earn the Central States VHF Society’s Reverse VUCC Award (VUCCr). Operators earn the satellite version by operating from at least 100 different grids. AMSAT member and *AMSAT Journal* contributor Allen F. Mattis, N5AFV, is one of only two amateurs who earned VUCCr through July 2008. Randy, N7SFI (now WI7P), is the other, and was the first.



AMSAT, The Second Decade - Part 1

by Dick Daniels, W4PUJ, w4puj@amsat.org

At the dawn of its second decade the sun shone brightly on the Radio Amateur Satellite Corporation. At birth in 1969, AMSAT consisted of a few dozen radio amateur operators largely located in the Washington DC area. They had banded together to carry on the series of small space satellites operating in the ham bands that had been pioneered several years before by the west coast Project OSCAR group. After ten years, AMSAT could boast a membership of over four thousand individuals. Groups worldwide had successfully arranged for launch of a satellite left from the earlier period and had designed, constructed and secured launch for three new increasingly capable long lived satellites operating in low earth orbit. And AMSAT groups were placing the final touches on a flagship spacecraft leading the way to operations from high, elliptical orbit. Supporting its membership and radio amateurs worldwide, AMSAT published an informative quarterly newsletter, maintained weekly information radio nets on a number of amateur bands and managed a network of Area Coordinators in both the U.S and overseas to help beginners and spread the faith. Following its example, an increasing number of national AMSAT organizations were created around the world. All this was accomplished through an organization made up of volunteers with the only salaried employee being Martha Saragovitz, the AMSAT Office Manager.

At the Beginning of the New Decade:

We Got a New Publication

The quarterly pamphlet-sized *AMSAT Newsletter* had served as the principle information source in print to the membership during the first decade. The first indication of a new era dawning for the organization in the second decade was the mailing in May 1980 of the first issue of *Orbit* magazine, a new, larger publication, printed partially in color and with a more professional layout replacing the quarterly *AMSAT Newsletter*. It would be published for four years. Then in February 1981, Issue 1 Number 1 of the *AMSAT Satellite Report* was issued. It was a bi-monthly larger format newsletter aimed at quick reaction information notes to keep the membership up to date.

Martha Got a New Office

After over two years of operating first from Perry Klein's guest bedroom and then keeping company with a washer and dryer in a suburban basement, a much more satisfactory office was found in a building located at 850 Sligo Avenue, Silver Spring, Maryland. Twenty eight years later, that same address works with only a change in office number.

And We Had a New Flagship Spacecraft to Launch

The first task in the second decade on the engineering side of the house was to support launch of the Phase IIIA satellite. It was a joint effort between AMSAT and the AMSAT-DL team in Marburg, Germany led by Karl Meinzer, DJ4ZC, that began shortly after the launch of AO-7. Originally planned for launch on a NASA Delta rocket, the early structure design was too complex to fit in the small space available. The Phase IIIA spacecraft was an order of magnitude upgrade from the earlier Phase II spacecraft. It was larger, heavier, had more power, stronger signals plus control by an onboard computer using a software language developed by Karl Meinzer called Interpreter for Process Systems (IPS), similar to Fortran. Serious hardware development began in 1977 with integration taking place in the AMSAT Laboratory located at the NASA Goddard Space Flight Center.

While the spacecraft was complete by late 1979, Ariane schedule delays caused the launch date to slip into early 1980. With first Ariane launch a total success, our number came up on the second. On the evening of May 23 a group gathered on the balcony of the Goddard Mission Control facility to follow the launch countdown from Kourou and provide a feed to the GSFC Radio Club station. All went well during the countdown as reported by a thick French accent from Kourou Mission Control. At the end of countdown the announcement was Liftoff - Radar has tracking and we were on our way! However, shortly afterward, an excited and repeated, "Non-Nominal Flight!" was followed by "Problem on one Engine!" That was followed by a sad, "The launcher is going down" and ending with an even sadder "Tracking is lost, Splashdown!". This was probably the worst day in the history of AMSAT. Our beautiful Phase IIIA spacecraft that was to have been AMSAT-OSCAR 9 in

orbit had ended up buried in the mud under the water near Devils Island.

The only thing we could say at this point was, **launch failure was new thing for us in the new decade.**

We Picked Ourselves Up, Dusted Ourselves Off and Started All Over Again!

After a short wake for Phase IIIA, serious discussions took place among the management and technical teams. The decision was to forge ahead! Supporting this decision was that we had a good design, some hardware already available and teams in place - and we weren't quitters! Further, there were strong indications that ESA would be willing give us another ride. To speed up the construction of Phase IIIB, Project Manager, Jan King, W3GEY, was to be supported by a small full time paid staff at the Integration Facility. In short order Gordon Hardman, ZS1FE, from South Africa, came on board as project engineer followed by Argentine machinist, Jorge Ordenez, as chief mechanic. They went to work supported by an eager force of AMSAT volunteers.

1980 - Organizational Activity

The most significant change in management early in the decade was the decision in mid year by founding president of AMSAT, Perry Klein, W3PK, to step down to devote more attention to his growing small business. Executive Vice President, Tom Clark, replaced Perry first as acting president and then confirmed as president by the board of directors (BoD) at the AMSAT General Meeting (AGM) in November at the Goddard Recreation Facility. Another action by the BoD was to appoint John Browning, W6SP, as chairman of the board of directors, a position he held so many years that it appeared to be a lifetime appointment. He became very well known through his regular W6SP Space Philosopher articles in the publications.

1981 - Personal Computing

Coming over the horizon in the late 1970's and exploding into the early 1980's was another technical revolution, the availability of small personal computers (PC). Initially applied to spacecraft command, control and telemetry for Phase IIIA, AMSAT soon undertook to broaden the use of PCs to a broad range of tasks including design support,



communications and satellite tracking. To support these activities, the AMSAT-80 Project came into being. Originally aimed at use with the available Radio Shack TRS-80 machines, it evolved into a standard system for use by the AMSAT satellite teams. This computer was based on the S-100 bus with a NorthStar controller board using the 8080 or Z80 chips with the maximum 64K of power hungry static memory. For satellite use, an additional AMSAT-designed TRUMP board was developed to provide support for command and telemetry applications. Disk drives used 10 sectored, hard sectored floppy disks and the operating system was CP/M. Primitive by today's capabilities, but remember, this was the early 1980's.

Track Those Satellites

Closely following the appearance of home computers was the development of programs for tracking satellites. In the early days of tracking tools used by Amateur Radio operators was a rotating plastic disk mounted on a chart provided by the Weather Bureau and adapted for AMSAT as the OSCARLOCATOR by long-time member Kaz Deskur, K2ZRO. With information on the time and longitude of a satellite's south to north Equator crossing, you could determine when a satellite would come over your horizon. With a computer and the right software package, tracking was a cinch! The first widely used software program became available in early 1981. It was Basic Orbits, developed by AMSAT's own Tom Clark, W3IWI (now K3IO). It was an instant success and the most widely used software for the next several years.

The British Are Coming - Again!

While the Phase IIIA satellite was intended to become AMSAT-OSCAR 9, it lost its place in line and was replaced by another candidate from England. Martin Sweeting, G3YJO, at the University of Surrey, England, had established a key command station needed to support the continuous commanding of AO-6. Starting from this beginning Martin and his group set out to become satellite builders. Support came from AMSAT, AMSAT-UK, the Radio Society of Great Britain (RSGB) and British Industry and Research Organizations. The first University of Surrey Satellite spacecraft (UoSAT) took the form of scientific and educational spacecraft. Stabilized by a gravity gradient boom and magnetic torquing, its payload included an earth-pointing CCD camera along with a digital communication experiment and

propagation studies in the Amateur Radio bands and radiation studies. On October 6, 1981 a NASA Delta rocket carried UoSAT-1 into orbit. Once in orbit it claimed the 9th slot and became UO-9. The mission got off to a rocky start when both 2m and 70cm transmitters were inadvertently switched on at the same time. It took some time and support from of a large radio astronomy dish to finally blast commands into an overwhelmed command receiver. From that point on, all went well and pictures of the Earth began to stream down to the eager Amateur Radio community.

And Then, The Russians Came Again!

With the Cold War still in full force, it had always been difficult to learn much about the state of amateur satellite activity in the Soviet Union. In 1981 rumors began to creep out of a coming launch. When it happened it was a whopper! On December 17, 1981, a Soviet launcher carried a cluster of six RS satellites into orbit, RADIOS 3-8. RADIOS 3 and 4 provided telemetry information while 5 through 8 carried transponders operating in the 2 meter and 10 meter bands.

1981 - Organizational Activity

Joe Kasser, W3/G3ZCZ, left the U.S. and the position of Director of Publications. He was replaced by Verne Riportella, WA2LQQ, who initiated a new bi-monthly newsletter series, *AMSAT Satellite Report*, aimed at timely news reports to the membership.

When the American Satellite Corporation came into being and started to use AMSAT in their advertising we became aware that we had never trademarked the name. AMSAT volunteer Norm Chalfin, K6PGX, a patent attorney at the Jet Propulsion Laboratory and a long time AMSAT supporter took on the case and after a prolonged battle was successful in proving prior use and convincing the Patent and Trademark Office to recognize our exclusive use of AMSAT.

1982 - Good Progress on Phase IIIB

Over the past year and a half, good progress had been made to bring our second flagship ready for launch. By starting with existing system designs and a determination to get back on track, the teams in the U.S. and Marburg, the spacecraft was ready by the fall of 1982. Improvements had been made in the earlier Mode B communications designs and a new receiver in the 1269 MHz band and downlinking in the 435 MHz band added Mode L. The earlier solid rocket kick motor had been replaced by a bi-propellant

liquid propulsion system using a 400 newton thruster that provided a multiple burn capability. While we were ready to launch, problems with the Arianne launcher program delayed our launch date until mid 1983.

Growing Interest in a PACSAT

In the previous year, efforts had already been made to take advantage of the growth in computer networking through the transmission of a series of short, interrelated digital packages called packets. The protocol that ensured compatibility was X.25.

In 1981, a group of AMSAT members in the Southwest and others joined together to bring the digital packet approach to the Amateur Radio networks. They organized under the name, The Tucson Amateur Packet Radio (TAPR). The first successful demonstration was the Digital Communications Experiment flown on the UO-9. It was very successful, but had its own unique protocol. The next major step forward took place at the AMSAT General Meeting at the Goddard Space Flight Center in the fall. In advance of the meeting, representatives of TAPR and other interested individuals were locked in a committee room with the edict not to come out without an agreed upon protocol. The result was the AX.25 protocol that made possible a firestorm growth of Amateur Radio packet networks that quickly spread around the world.

With the rapid growth of packet radio in the Amateur Radio community it is not surprising that interest in an Amateur Radio satellite dedicated to packet radio communications increased. The first formal proposal was made at the fall 1986 AGM and Symposium. Before long, demonstrations in space were occurring as packet transmissions were sent through the linear transponders on operating AMSAT spacecraft. AMSAT's first serious effort to develop a PACSAT involved another non-profit organization, Volunteers In Technical Assistance (VITA). This organization focused its efforts on developing technologies that could be easily used at the village level in poor countries around the world. VITA was already experimenting with amateur packet radio networks for communications in rural areas. Developing a relatively inexpensive space relay was seen as being a mutually beneficial proposition for both organizations. Harold Price, NK6K, took on the task of representing AMSAT with VITA in developing a small proof of concept space satellite to be launched from a space shuttle



GAS can (Getaway Special Canister). The joint effort continued for some length of time, including several conferences and design reviews. VITA in the end was not able to secure the necessary resources to support the development of a demonstration flight, but the planning continued at AMSAT.

1983 - The Second Flagship Takes Flight

When the Arianne launch schedule settled down the Phase IIIB satellite found itself manifested on Arianne L6 and traveling first class. No piggyback this time. We were treated as one of two primary payloads housed in the lower payload container designed to carry large communications and weather satellites. Following an uneventful countdown on May 1983, Phase IIIB soared into orbit and claimed its number - AMSAT-OSCAR 10. While we had achieved orbit, the space gremlins had not forgotten us. After release early telemetry indicated that rather than planned clockwise rotation at 10 rpm in an attitude favoring the sun angle, our bird was rotating counter clockwise at 1 rpm with an orientation that placed the sunlight on its top surface where there were no solar cells. Some time later an investigation by the launch authority determined that, after release, venting from the third stage engine caused it to catch with and bump our spacecraft. Fortunately, it was not too long before the attitude shifted to a position providing for more power and we were then able to spin up the spacecraft and position it for the first burn. The good news was that the first burn of the motor ignited on command. The not so good news was that the burn was longer than expected. To compound things, the time required to maneuver into position for the second burn, gave a leak in the helium bottle time to empty it. While we were not in the orbit we had planned, the longer first burn gave us a reasonably usable long term orbit. After careful checkout, AO-10 was open for business and did they come!

Enter the Ham in Space

The earliest effort to take advantage of U.S. astronauts licensed to operate in the Amateur Radio bands took place at the time of the Skylab space station operations in the 1970's. Astronaut Owen Garriott, W5LFL, had agreed to operate from the station during his tour of duty in the third crew on the Skylab if NASA would permit. The formal request to do this traveled all the way to the top of NASA management and came very close to approval until concerns

about the existence of a communication channel outside the agency control vetoed the proposal.

Ten years later, in April 1983, AMSAT President Tom Clark and ARRL President Vic Clark were able to jointly announce that permission had been secured from NASA for the same Owen Garriott to operate an Amateur Radio station from the Space Shuttle during his STS-9 mission in the fall of 1983. With strong support from hams at the NASA Manned Space Center and others, a 2 m FM station was assembled and tested, an antenna designed to mount into a shuttle side window was fabricated and we were ready to roll. On November 29, 1983 STS-9 lifted into space for a 10 day mission and Owen found opportunity to make a large number of contacts with members of the raging mob below.

1983 - Organizational Activity

In March 1983 William L. Lazzaro, N2CF, was selected for the position of AMSAT General Manager. This position was located at the AMSAT office. In addition to generally strengthening the management of the organization, he was tasked to improve long range planning and seek new sources of funding.

Another break in tradition took place in the fall when the AMSAT General Meeting (AGM), that, had traditionally been held at the Goddard Space Flight Center, was held at the Johns Hopkins University Applied Physics Laboratory. The agenda included a Space Symposium where papers were presented the proceedings published. At the BoD meeting the success of this event resulted in the decisions not only to continue symposia at subsequent AGMs but that the meetings would take place in different geographic locations throughout the United States. Also at the BoD meeting, Jan King announced that he had accepted an offer to become Vice President of Engineering at Skylink, Inc. and would be shortly moving to Boulder. He assured all that he intended to continue in his full role as AMSAT's Vice President for Engineering involved in planning for another Phase III mission designed to build on the success of AO-10.

1984 - Phase IIIC

Once AO-10 was secure in its final orbit, the construction teams turned to planning for the next flagship satellite. An early decision, made at the time the beginning of the AO-10 development, was to build backup flight units for each of the critical hardware and

systems, including a backup flight structure and solar arrays. With Jan King's move to Boulder, Colorado conducting the spacecraft integration at the AMSAT Lab at Goddard was not feasible. Arriving in Colorado, Jan immediately undertook to pull together a group of highly motivated and technically capable local radio amateurs in the area and was able to secure space for integration in the facility of the Solar Energy Research Institute (SERI) near Denver. We were off and running again! Design for the next Phase III spacecraft was for an AO-10 on steroids. In upgrading the communications capability, Mode B and Mode L were retained and improved along with the addition of new communication capabilities operating in Mode J and Mode S plus the RUDAK, short for Regenerativer Umsetzer fur Digital Amateur-Kommonikation (Amateur Radio Digipeater), to bring packet radio based on the AX.25 protocol. RUDAK was being developed by a group in Munich, Germany. Testing the RUDAK prototype was carried out by installing it at the top of a Munich water tower and encouraging its use by all hams in the area. It became famous over all of Germany.

Another UoSAT? You Can, but you have to be Quick!

With the success of UO-9 Martin Sweeting and his team began looking for a ride for a follow-on mission. On checking to see if another Delta launch might be available they got an interesting response. The answer was that a launch opportunity was available, but they would have to deliver their spacecraft in six months. Premature demise of the LANDSAT-4 earth resources satellite resulted in the replacement mission, originally scheduled for August 1985 being moved up to March 1984. With a collective big "gulp!" they took off running. With a spacecraft structure and stabilization system similar to that of UoSAT-1 and with a payload that included an improved version of the previous charge-coupled-device earth pointing camera, a particle wave experiment, synthesized speech experiment, a new packet communications experiment using AX.25 and a space dust experiment (read, microphone). With unbelievable speed and luck, the Surrey team was able to deliver on time and the UoSAT-2 became UO-11 upon reaching orbit on March 1, 1984. The space gremlins again came awake and shortly after reaching orbit the spacecraft went silent. The immediate recovery efforts failed to bring it



to life and as time went by it appeared to have been a total failure. Ten weeks later a team using large radar dish in Greenland heard faint signals. Renewed efforts to command the spacecraft were successful on May 15, and the bird was found healthy! Low temperature sensitivity on a critical device appeared to have been the problem. The spacecraft was checked out, commissioned and ready for a long and useful life.

International Planning and Coordination

The first formal meeting of representatives from the groups around the world involved in the planning and constructing of Amateur Radio satellites took place in Paris on October 2-4, 1981. A follow-up meeting was held at a resort hotel near Cheltenham, England in June/July 1984 that brought together representatives of AMSAT, AMSAT-DL, AMSAT-UK and individuals from several other countries. The group reviewed the status of recent launches and discussed plans for future projects. In particular, the planning for a satellite dedicated to packet radio communications was presented and discussed. The other issue that came up was the need for an International Amateur Satellite Service Committee to assist in frequency coordination of the increasing number of Amateur Radio satellites being developed or planned in a number of countries.

A University Satellite?

In an outreach effort to the university community to attract interest in AMSAT it was brought to our attention that a small satellite construction program was already under way at Weber State University in Utah. Following up with the group at Weber State, AMSAT learned more about the NUSAT project, a small satellite to test and calibrate FAA radar equipment. The satellite was designed to be launched from a GAS can carried in the bay of the Space Shuttle. NUSAT had a successful launch from the Shuttle, but due to a component failure the spacecraft failed to function. Despite the unfortunate outcome of the NUSAT project, the relationship with Weber State was established and resulted in a mutually rewarding relationship for years to come. Dick Jansson, WD4FAB, a key player in the Phase III programs, was given the additional responsibility to coordinate volunteer activity. In this capacity, he became the principle AMSAT interface with Weber State.

1984 - Organizational Activity

The Symposium and Annual General Meeting was held November 15-16 in Los Angeles. President Tom Clark having successfully led the organization from the depths of the PIIIA failure to the heights of OSCAR-10 in orbit, requested release from the office of President. This was accepted with profuse thanks and Executive Vice President, Verne Riportella, WA2LQQ, moved up to become the third AMSAT president. With the success of Owen Garriott's flight and the promise of others, Bill Tynan, W3XO, was appointed to the new position, Vice President for Manned Flight. ☸

[Editor's Note: This article will continue in the next issue.]

AMSAT Engineering

Engineering Task Force Update

Bill Ress, N6GHZ, n6ghz@amsat.org
Task Force Chair

The AMSAT-NA Engineering Task Force members are Tom Clark, K3IO, Drew Glasbrenner, KO4MA, Tony Monteiro, AA2TX, Lou McFadin, W5DID, and myself Bill Ress, N6GHZ. It was created at the 2008 October AMSAT-NA annual board meeting in Atlanta to support engineering activities while the search for a Vice President of Engineering was continuing. Since that time we have held telecon meetings almost every other week focusing on satellite rideshare opportunities and plans for developing the modularization of satellite hardware.

SuitSat-2 Support

The Task Force recognized that the engineering development efforts, which have been on going since the launch of SuitSat1, would be the first candidates for the modularization concept endorsed by the board. Also, toward the end of 2008, the SuitSat-2 engineering activities were becoming more focused for a potential launch in 2009 and were in need of additional support.

This become the right time for the Task Force to support the current SuitSat-2 team and from that effort obtain the first modularized



Please support AMSAT-NA.
Thanks!

circuit functions which could be used in future satellite development.

Task Force member Lou McFadin, W5DID, was already supporting SuitSat-2 activities in his role of SuitSat-2 Hardware Manager and designer of the 2 meter and 70 cm antennas. Tony Monteiro, AA2TX, took on the task of supporting the SDX (Software Defined Transponder) development and I focused on defining and developing the COMM RX and TX (communications receiver and transmitter).

As you will read else were in this issue, hardware development and integration is in "high gear" with a goal for a hand over of completed flight hardware in September of this year.

Rideshare Opportunities

In addition to activities on the hardware side, the Task Force has been actively working to uncover satellite launch opportunities. Drew Glasbrenner has taken the lead by identifying three possible US "rideshare" opportunities. Lou McFadin is also in discussions with a possible rideshare partner.

The most promising opportunity, which could result in a launch in year 2011, is being pursued by Drew, with AMSAT-NA being considered as a satellite team member. As more details are obtained, and an appropriate "fit" for AMSAT is developed, it is expected that the Task Force will prepare a proposal for the board presentation at the beginning of this fall. Since the discussions at this point are preliminary, we will defer further discussion of this opportunity until more details are obtained.

There is much to be done to identify additional launch opportunities, so if you hear about an opportunity where AMSAT-NA might participate, be sure to pass that information along to any of the Task Force members. ☸





AMSAT-UK Colloquium 2009

URGENT UPDATE

Earlier this year AMSAT-UK announced its intention to hold its Annual Colloquium in 2009 at the University of Manchester over the weekend of July 24-26th.

Unfortunately it has not proved possible to produce a program including the food and accommodation at rates that would match or be more economic than those of previous years.

Therefore, to ensure the best possible event for the largest number of visitors the venue has been changed to the Holiday Inn Hotel at Guildford - this is very close to the Surrey University where the event has been held previously.

The 2009 AMSAT Colloquium will now commence at 10 a.m. on Saturday July 25th and close at approximately 4 p.m. on Sunday. Accommodation will be available, at special rates, on Saturday evening and also on Friday and Sunday.

The new venue will enable visitors to attend at a significantly lower cost than last year and experience greatly improved accommodation.

The two days will be filled with presentations covering all the latest amateur satellite happenings and developments.

The new GB4FUN trailer will also be in attendance and available to demonstrate satellite operations.

An informal social gathering is planned for those who are able to arrive on Friday evening.

Full details of the booking arrangements will be made available shortly on the AMSAT-UK Web site, www.uk.amsat.org

73,
Jim Heck, G3WGM
Hon Sec AMSAT UK

Support AMSAT

New Version!

AMSAT is the North American distributor of **SatPC32**, a tracking program designed for ham satellite applications. For Windows 95, 98, NT, ME, 2000, XP, Vista.

Version 12.8 has improved Windows Vista compatibility and enhanced support for tuning multiple radios.

Version 12.8 Features:

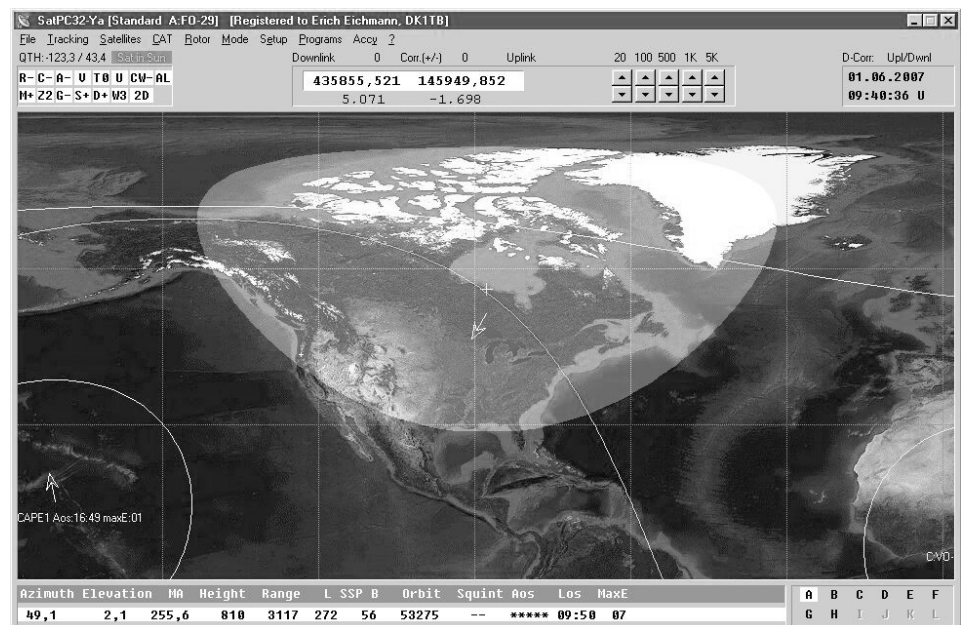
- Select 2D/3D map with a single mouse click
- Select Political/Physical map with a single mouse click
- AOS voice announcement
- Countdown program displays next AOS of your favorite satellites
- Automatic Internet download of Keplerian elements.
- Graphical tracking on a world map with two selectable Zoom factors.
- One-click satellite switching using 12 "letter" buttons.
- Automatic rotor control support for: LVBTracker, Kansas City Tracker/Tuner, FODtrack, Uni_Trac, SatEL, Labjack U12/U3/Piggyback, W0LMD Mini/Junior/Senior Trackers, Yaesu GS-232, ARS from EA4TX, EGIS rotors, IF-100, RIF-PC, AMSAT-DL interface, WinRotor32, HalloRotor, and WiSP DDE clients.
- Doppler tuning with on-screen frequency displays. Radio models supported:
Yaesu FT-847, FT-736R, FT-817, FT-857, FT-897
ICOM IC-820H, IC-821H, IC-910H and other ICOM radios
Kenwood TS-790 and TS-2000
DDE client programs
- "Transparent" VFO-knob tuning in addition to keyboard and mouse tuning.
- "Virtual" VFO tracking for half-duplex transceivers FT-817, FT-857, FT-897, IC-706 and IC-7000.
- Includes a special version for ISS split-frequency operation.
- Controls subaudible tone on FT-847, FT-736R, FT-817/857/897, TS790A and IC-910H.
- Includes a non-graphical version and programs that output lists to the screen, printer, or a file.
- Interfaces with WiSP, with user-defined satellite switching priority.
- Includes a separate program for tracking the Sun and Moon.

Price is \$45 for AMSAT members, \$50 for non-members, on CD-ROM.

A demo version may be downloaded from <http://www.dk1tb.de/indexeng.htm>

A registration password for the demo version is \$40 (members), \$45 (non-members). Order by calling 1-888-322-6728.

The author DK1TB donated SatPC32 to AMSAT. All proceeds support AMSAT.





LVB Tracker Box

- Reasonably priced and all profits go to AMSAT
- USB or serial interface
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- Open software
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- Uses GS-232A or Easycomm I/II protocols

Contact Martha at the AMSAT office 301-589-6062 to order.

The complete units will be built in groups, so get your orders in early.

Units will be shipped as they become available.

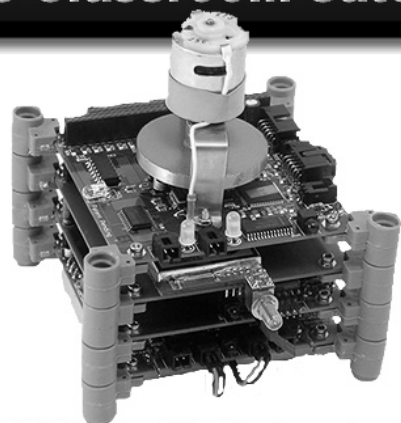
- 1) Bare board - \$20 + S&H - no parts kits available
- 2) Populated board, serial interface - \$100 + S&H - no kit with USB unit, rotor cable and LCD available, we do have a parts list with recommended part numbers and sources.
- 3) Custom Ten-Tec Enclosure powder coat, silk-screened, drilled/punched - \$50 + S&H
- 4) Complete unit - board, USB output, rotor cable, LCD, enclosure - \$200 + S&H **our most popular

Documentation for the LVB Tracker can be found at: <http://www.LVBTracker.com>

Boards and complete units may be ordered from the AMSAT office at 301-589-6062 or from martha@amsat.org



The Classroom Satellite



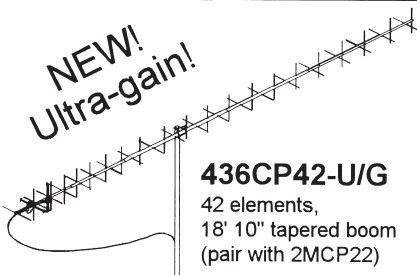
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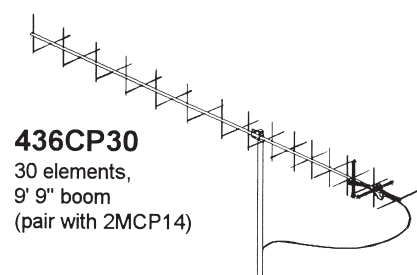
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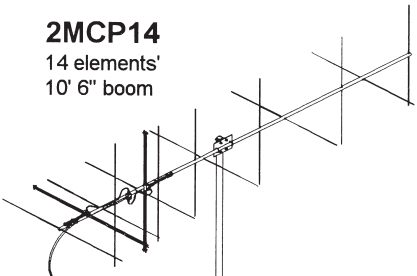
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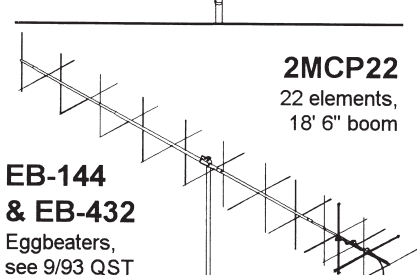
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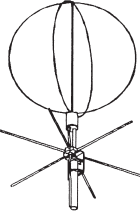


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A Workshop to Build a "CJU" Antenna

by Juan Antonio Fernández Montaña, EA4CYQ, ea4cyq@amsat.org
Chairman of "Francisco de Orellana" Radio Club

At the "La Serena-Vegas Altas" area in the southwest of Spain, the tradition of working satellites is deep-rooted. EA4CYQ was very active on the RS10/11 satellite a long time ago. Now EB4DKA has encouraged many of us to test the different modes that amateur satellites can offer us, from NOAA to the more complex bands such as 1.2 GHz and 2.4 GHz.

It is now recognized by the AMSAT community that the CJU antenna lets us work amateur satellites with a minimal investment. Our VHF 50 watt mobile station with a $\frac{1}{4} \lambda$ whip on the car roof for transmitting and a capable UHF HT receiver attached to a CJU antenna will be enough of a setup if we have achieved the basic skills to operate such a station. It has been proven that the outcome with this modest station can

"Francisco de Orellana" Radio Club. We have demonstrated that this antenna can be made in 4 hours at a cost of less than 3 dollars.

On Sunday April 27, we got together for the workshop. Pedro, EB4DKA; Fran, EA4FRI; Miguel, EA4EWX; Ramón, EA4ERA; ham radio beginners Alberto and David, José, EA4EQJ; Juan, EA4CYQ; Antonio and Manuel, EA4YR, joined us for a while. We started the workshop at 9:00 a.m. At 10:15 we took a break to drink a hot cup of coffee after struggling to assemble a BNC connector to a piece of RG-58. By mid-morning Pedro, EB4DKA, showed us how we could receive during an FO-29 pass with a TH-F6 HT attached to a CJU antenna. We could listen to several stations from central Europe with impressive clarity. At 1:00 p.m. we took a photo with the faultless CJU antennas in our hands.

We enjoyed a great atmosphere during the whole workshop and we look forward to joining the next field event scheduled on May 10 to test our CJU antennas in a new, never worked grid locator.

A new generation of satellite hams is emerging to preserve this branch of this amazing hobby in the area.

You can find details of the CJU antenna and other articles about amateur satellites at: <http://eb4dka.laserenadigital.com> 

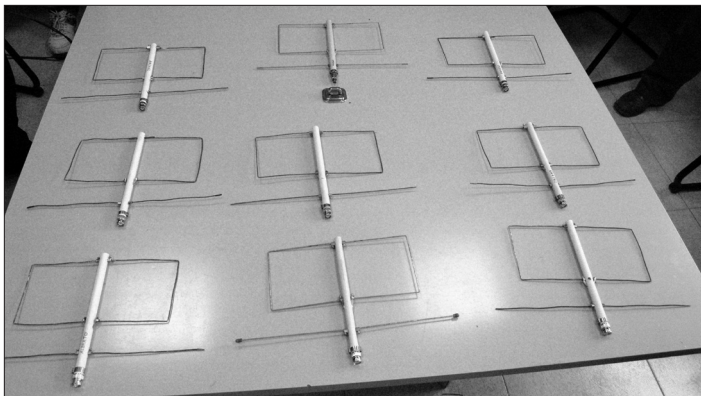


EA4CYQ leading the workshop to build the antennas.

After reading a great deal on this subject, we wanted to take advantage of our experience working satellites in both portable and base station operations. We made the most of our experience and the CJU antenna (Canary Jail Umbrella) was born. It was based on the TPMII (Texas Potato Masher) design by K5OE, but with the idea of mobile/portable use on our minds.

be similar to a modest base satellite station equipped with multiple Yagis and azimuth and elevation rotor control.

Hams from our area have asked us for advice on how to build a CJU antenna so we decided to schedule a workshop to assist these hams with construction of their own antennas. We settled down to work on planning the workshop, which was sponsored by our



The completed antennas.



A happy group of hams with their new antennas built during the workshop.

Frank Bauer - ARRL President's Award

On Saturday, May 16 during the forum featuring Richard Garriott, W5KWQ, at the Dayton Hamvention®, ARRL President Joel Harrison, W5ZN, presented former Amateur Radio on the International Space Station (ARISS) International Chairman Frank Bauer, KA3HDO, with the ARRL President's Award. Bauer, who stepped down from ARISS and AMSAT duties this past March, served as ARISS Program Leader and ARISS International Working Group Chair. Since 1991, he served as the Radio Amateur Satellite Corporation's (AMSAT) Vice President for Human Spaceflight Programs.

The ARRL Board of Directors voted to create the President's Award in 2003. The President's Award is to go to an ARRL member or members who "have shown long-term dedication to the goals and objectives of ARRL and Amateur Radio," and who have gone the extra mile to support individual League programs and goals. Nominations for the award come from directors and are approved by the ARRL President and the Executive Committee.

Under Bauer's leadership, Amateur Radio activities have been on human spaceflight vehicles, including NASA-sponsored ham radio activities on the shuttle, Space Station Mir and the ISS. Starting in 1983, Bauer led the Goddard Amateur Radio Club team that provided around-the clock space shuttle retransmissions from the WA3NAN club station. These retransmissions provided the international ham radio community with up-to-the-minute information during the flight of Owen Garriott, W5LFL, on STS-9 and subsequent SAREX flights. In the days prior to the Internet, these real-time bulletins and frequent orbital element updates could only be obtained through Amateur Radio.

"For well over a decade, I have been fortunate to be part of a group that has been leading the effort to lead international teams together to focus on Amateur Radio on the ISS," Bauer told the ARRL. "As AMSAT Vice President for Human Spaceflight since 1991, I have really worked to get this international team to work as one, focusing on Amateur Radio. It is very critical to get all the space agency partners to have a vested interest in making sure we do Amateur Radio right on the ISS. We need to keep the partnership we have with our international team in good stead."

Bauer said that through the years, the AMSAT and ARISS teams have developed a substantial amount of hardware and

software systems on the ISS. "We have trained astronauts and cosmonauts to use the equipment that we have on many modules," he said. "We have two systems on the Russian module with five antennas, and two L/S band antennas on Columbus, with new ones going up later this year -- all of this is being done by a volunteer team. Both AMSAT and ARISS have done a tremendous job promoting Amateur Radio, allowing hams to talk with astronauts and encouraging children to pursue technical careers."

Bauer said that when a new crew of astronauts comes on board at NASA, ARISS gives them a briefing, familiarizing them with the ARISS program and Amateur Radio in general. "We are very fortunate that all of the US astronauts of late have received their Amateur Radio licenses," he said. "We emphasize to them how important it is to get their license early in their training, because as their training progresses, they get caught up in everything and it is hard to find the time to study and take the exam. From an astronaut perspective, I think it's a little easier for them to pass the test, since they know most of the theory stuff, but they do need to be trained on the rules and regulations that govern the Amateur Radio Service."

ARRL President Joel Harrison, W5ZN, said he was very honored to present Bauer with his award. "I have had pleasurable opportunity first hand to see Frank work with the international community to ensure Amateur Radio became and remained a part of manned space flight. Frank's ability to organize all parties to consensus regarding key issues was vital to the program. The amateur community owes a great deal of gratitude to Frank for his many years of dedication to service and education."

Bauer told the ARRL that he was "proud and humbled" to receive the ARRL President's Award. "It was a total surprise, I did not expect any of this. I am even more humbled when I recognize how big of an award this is and so rarely given. I want to thank the



Joel Harrison, W5ZN, ARRL president (left) presents the ARRL President's Award to Frank Bauer, KA3HDO.

ARRL leadership for this very prestigious award. And thanks to the entire ARISS volunteer team for their outstanding support and diligence in inspiring our next generation of explorers through Amateur Radio contacts between school students and crew members on the ISS."

ARRL ARISS Program Manager Rosalie White, K1STO, who, together with Bauer, served as the USA delegates to ARISS, told the ARRL she was "very happy" for her colleague and friend: "Over the years, Frank continuously gave more to the ARISS project than anyone could ever expect of one person. He put his heart and soul into ARISS because he believed in its objectives: To introduce teachers and youth to Amateur Radio and the foundation of radio science, plus provide students with a way via radio to get involved in science, technology, engineering and math."

Bauer is currently the Chief Engineer for the Exploration Systems Mission Directorate at NASA. This directorate is developing the next generation human spaceflight vehicles that will take NASA to the International Space Station (ISS) and then to the Moon, Mars and beyond. He is also providing some backup support to the Space Operations Chief Engineer who supports the space shuttle and ISS programs. ☺



Oscilloscope or Zelscope?

by Pete Carr, WW3O, wb3bqo@yahoo.com

Many hams have older model oscilloscopes in their shacks that use cathode ray tubes. Some have limited screen size and very few will save screen shots to a file. The older scopes are fairly easy to use and many of us would not want to part with this wonderful tool. Still, they have some limitations.

I have been interested in the nature of noise as generated by the Earth and the sky. The objective was to try and identify characteristics of noise and try to minimize it in satellite reception. I hooked up my Leader scope to some downlink receivers and was not happy with the loss of detail in the presentations. Granted that the Leader is only a 40 MHz scope with limited controls and no screen shot saver. However, I was hoping for better results.

I searched the Internet and came up with a computer program called Zelscope [1] that uses the sound card as an input converter.

and the program loaded to the machine without problems. Now that the program was installed I needed to connect the sound card to the outside world. (see Figure 1)

I chose to use RG-174 mini-coax with a 1/8-inch mono plug connecting to the sound card. A 1/4-inch mono plug was then installed on the other end of the coax to connect to earphone jacks of the various rigs.

For testing purposes I used a Kenwood TS-130 HF

I double clicked on the “speaker” icon at the bottom right corner of the screen.

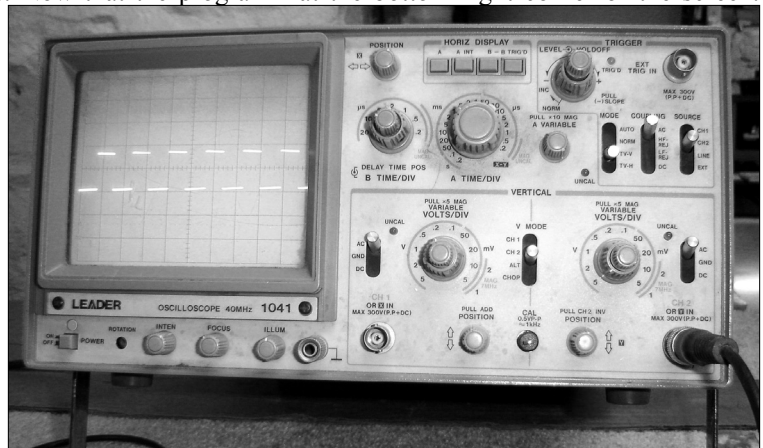


Figure 2: A Leader 1041 40 MHz oscilloscope is shown with the same 1 kHz square wave fed to the display. This is an older scope with many hours of use, so there is some loss of sharpness in the display. The intensity control has major effect on sharpness. Lower intensity adds sharpness, but makes the waveform harder to see in detail.

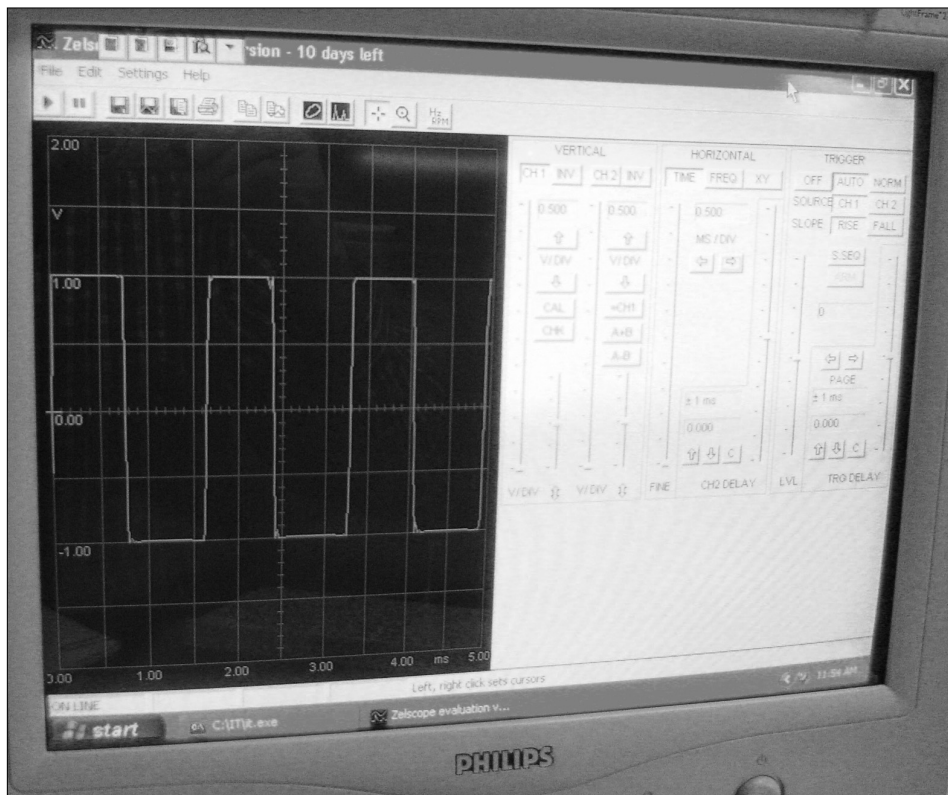


Figure 1: The Zelscope program is running on the computer screen. The display shows a 1 kHz square wave with the scope controls on the right side of the screen.

This program is offered on a 15-day trial with a purchase cost of about ten dollars. Certainly it was inexpensive enough to try. I downloaded Zelscope and expanded the file. My computer runs Windows XP

rig tuned to WWV. The deflection of the baseline of the Zelscope presentation was flat unless I cranked the Kenwood volume up to maximum. It was time to investigate the sound card settings.

This brought up sliders that adjust various volumes. I set the slider to half way up and checked that the “mute” boxes below the sliders were not checked. Then I clicked the Options selection at the top left of the screen and then the Properties selection. This brought up the Recording volume set of sliders. The slider for Microphone was selected in the box at the bottom when the screen came up and its’ slider was at middle setting. I moved it to the top and went back to try the results.

The Zelscope presentation was unchanged with full volume of the rig needed to see a deviation in the scope baseline. Since the results were the same it was reasonable to assume that the controls I had adjusted were not the right ones. I went back to the Recording volume controls again and changed the select mark from the Microphone to the Line-in slider. Then I moved it to the top and went back to the Zelscope program again.

Success! There are some really confusing icons on the sound card jacks and I thought the one I plugged into was the microphone jack. It was the Line-in jack instead. Now, with the volume of the Kenwood at normal listening volume there was excellent deflection of the scope baseline.

I spent about an hour getting used to the various controls of the scope and found that they were similar to the ones on the Leader.

Since the computer screen is considerably larger than the Leader I found that details on the waveforms were much easier to see. The trigger on the Zelscope also seemed more stable and predictable than the Leader.

Most scopes have a grid that can be used to check rise and fall time of waveshapes. The Zelscope has a grid that can be turned off and on. My Leader has the grid as a mask on the screen that is illuminated or darkened but is still there to some degree. It was strange to see a scope presentation without a grid as on the Zelscope. This feature is a nice touch after you get used to it.

The bandwidth of the Zelscope is only about 24 MHz while the Leader is about 40 MHz. Since I was interested in presentations from the output of various radios the bandwidth wasn't an issue in this case. The larger, sharper screen presentation of the computer monitor was a big plus.

There is the issue of probe compensation. The Leader (see Figure 2) has a screw adjustment on the probe that is used with the calibrated output to display a square pulse. No such adjustment is possible with the Zelscope unless a regular scope probe was grafted to the sound card input. As you can see in the two pictures, the square wave of a 1 kilohertz waveform is very nearly identical on both scopes. The generator, a 555 chip set up for 1 KHz and powered from a 9-volt battery, was used on both scopes. It appears that, for practical purposes, the issue of scope probe compensation is not a problem.

There is a nice toolbar at the top of the Zelscope screen that allows you to save or print files from the screen. The scope is dual trace with independent controls so the normal dual trace waveform comparisons are easy to perform.

I have not tried the program on a lap top computer, but would believe that it would work just as well as on a desk top. This would add portability to testing.

To sum up, the Zelscope program is an excellent addition to the toolkit of any ham and especially those involved with electronics construction and testing.

Resources

- [1] The Zelscope program may be downloaded at www.zelscope.com 

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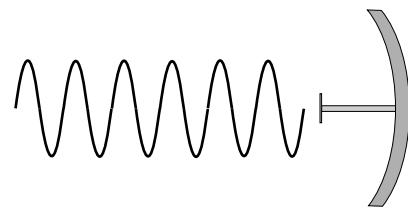
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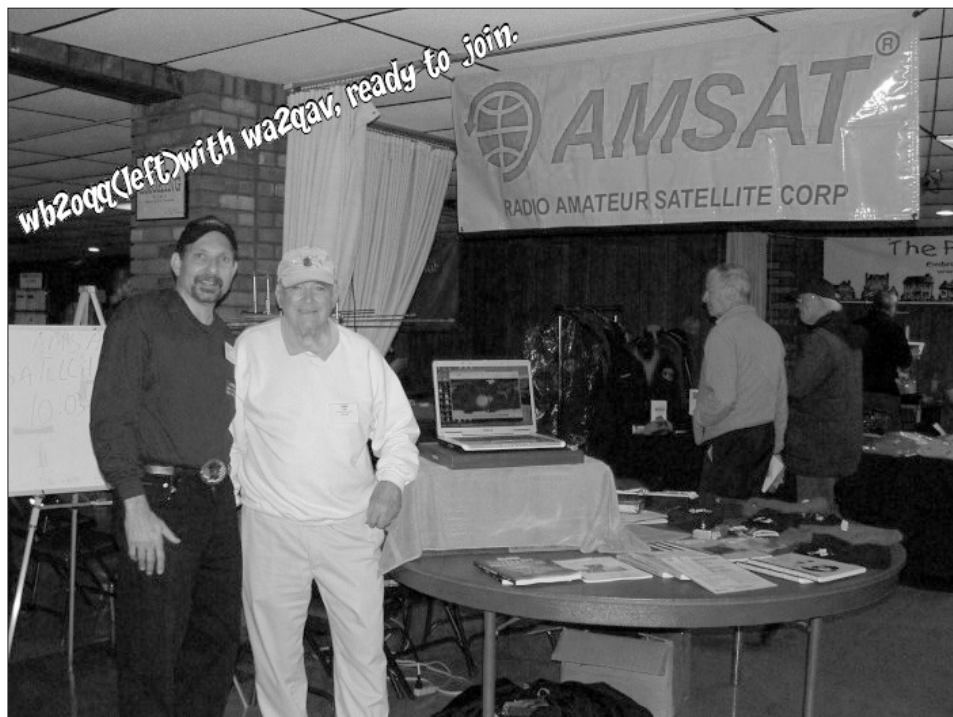




Here are a couple of pictures for *The AMSAT Journal* from the Great South Bay Amateur Radio Club's hamfest on May 9th, 2009. It was a terrific opportunity to showcase AMSAT to an area that has not had much exposure to the satellite community. We sold, we educated, we had a satellite demo and hopefully we will add a few new members and signals to the "birds"!

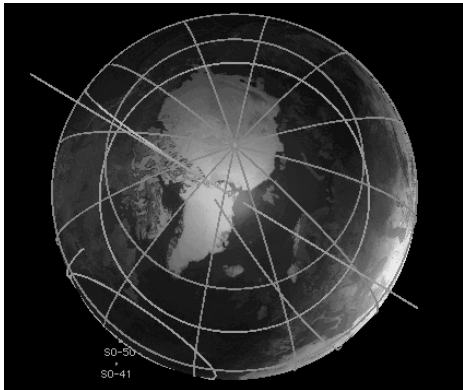
73's,

Pete, WB2OQQ ☸



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A Maxim-2633 Single Chip VHF-to-Microwave Preamplifier

by Prathap Kumar, VU2POP, vu2pop@gmail.com

My new RF pre-amplifier is a project based on the Maxim MAX2633 SMD IC wideband preamp chip and can be built on a very small double-sided printed circuit board with dimensions of 15x15 mm. It's so small that it can be installed inside a base or mobile radio, especially in older rigs whose receiver sensitivity is poorer than present day radios. Don't let the SMD portion scare you away from this easy project! I soldered it using the usual pencil tip soldering iron since I do not own any SMD workstation equipment.

SMD soldering with regular tools. Photo 1 shows my completed project. I added a surface mount SMD 78M33 3.3 volt regulator to my project so I could power it from 3 to 5 VDC power supplies in the shack. After completing this preamp and connecting it to my radio I observed a 3 S-unit increase in the received signal strength. Also, very weak signals almost down in the noise were heard clearly.

Maxim provides additional design details in their datasheet. I have summarized the important design details here. The MAX2633

contribute negligible reactance in a 50 ohm system at the lowest operating frequency. Use the following equation to calculate their minimum value:

$C_{block} = 53000 / \text{freq [pF]}$ (Note: use minimum operating frequency for calculations)

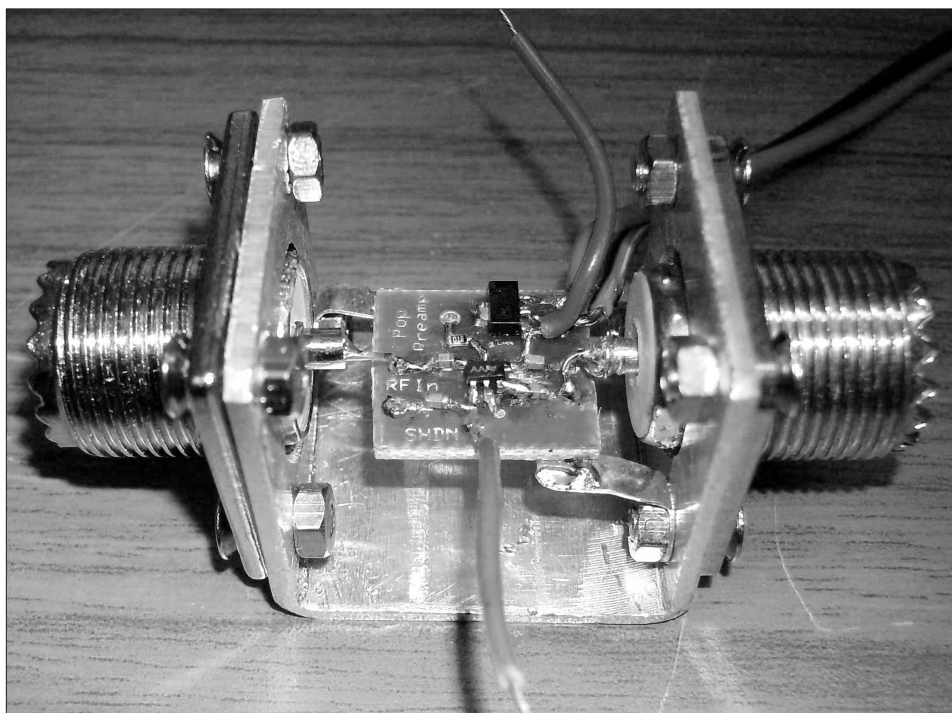


Photo 1: Preamplifier construction.

Some of the general characteristics of this RF pre-amplifier chip include:

- Operates from 2.5 to 5V max. (nominal voltage 3.5V)
- Current draw of 6.6 ma
- Gain 13.4 dB
- Noise figure around 3dB

I found most of the design details on the Maxim IC Web page. There you will see some of the information I have presented here to give you a better overview of this project. The Maxim datasheet can be found on-line at: <http://datasheets.maxim-ic.com/en/ds/MAX2630-MAX2633.pdf>

I don't claim to be a great designer, just a ham experimenting for fun. It's a good project and with care you can perform the

is a low-voltage, low-noise amplifier for use from VHF to SHF frequencies. Operating from a single +2.7 V to +5.5V supply, it has a virtually flat gain response up to 900 MHz. Its low noise figure and low supply current makes it ideal for RF receive, buffer and transmit applications. The MAX2633 is biased internally and has a user-selectable supply current, which can be adjusted by adding a single external resistor (R_{bias}). This circuit draws only 3 mA current.

Besides a single bias resistor, the only external components needed for the MAX2630 family of RF amplifiers are input and output blocking capacitors ($C1$ and $C3$) and the Vcc bypass capacitor, $C2$. The coupling capacitors must be large enough to

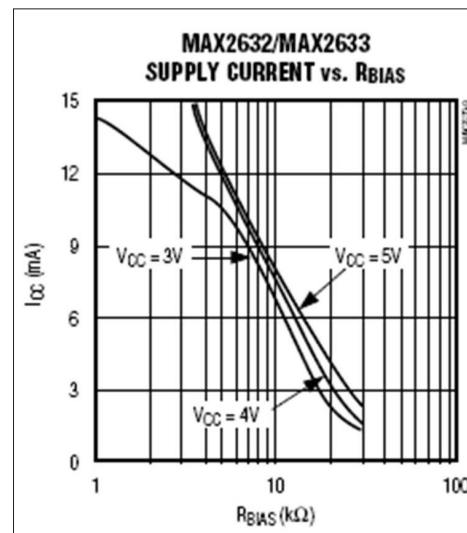


Figure 1: Supply current vs. Rbias.

The Vcc pin must be RF bypassed for correct operation. To accomplish this, connect a capacitor between the Vcc pin and ground as close to the package as is practical. Use the same equation given above (for DC blocking capacitor values) to calculate the minimum capacitor value. If the PC board has long Vcc lines, additional bypassing may be necessary. This can be done farther away from the package, if needed.

Proper grounding of the GND pin is essential. If the PC board uses a topside RF ground, connect it directly to the GND pin. For a board where the ground plane is not on the component side, the best technique is to connect the GND pin to it with a plated through-hole close to the package.

An on-chip buffer at the MAX2631/MAX2633's SHDN (shutdown) pin makes bypassing this pin unnecessary, except in very noisy applications. When RF filtering is needed, use a bypass capacitor similar to the one used on Vcc. Since negligible current flows into this pin, additional RF filtering may be done with a series resistor.

To set the MAX2632/MAX2633's supply current, connect a resistor from the BIAS

pin to ground. To estimate the value of this resistor, refer to the bias current graph (Figure 1).

The circuit board is made from FR-4 material with a 31-mil layer thickness between the RF lines and the ground plane. 

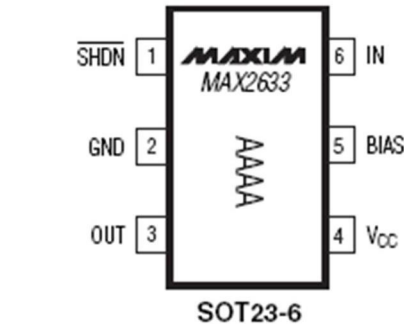


Figure 2: Pinout.

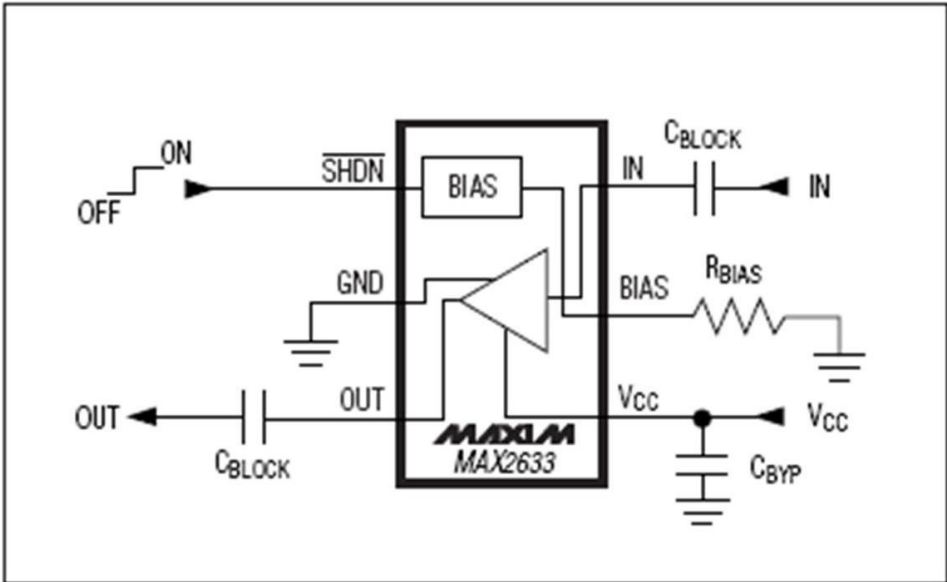


Figure 3: Circuit schematic.

PIN				NAME	FUNCTION
MAX2630	MAX2631	MAX2632	MAX2633		
3	5	5	6	IN	Amplifier Input. Use a series blocking capacitor with less than 3Ω reactance at your lowest operating frequency.
2	2	2	2	GND	Ground Connection. For optimum performance, provide a low-inductance connection to the ground plane.
1	3	3	3	OUT	Amplifier Output. Use a series blocking capacitor with less than 3Ω reactance at your lowest operating frequency.
4	4	4	4	VCC	Supply Connection. Bypass directly at the supply pin. The value of the bypass capacitor is determined by the lowest operating frequency, and is typically the same as the blocking capacitor value. Additional bypassing may be necessary for long VCC lines.
—	1	—	1	SHDN	Shutdown Input. Driving SHDN with a logic low turns off the amplifier.
—	—	1	5	BIAS	Bias Resistor Connection. Connect a resistor to GND to set the bias current. See the Supply Current vs. R_BIAS graph in the Typical Operating Characteristics.

Figure 4: Pin functions.

Typical Operating Characteristics:

- Vcc = +3V
- V_SHDN = Vcc (MAX2631/MAX2633)
- Z₀ = 50 ohms
- f_{in} = 100 - 900 MHz
- R_{BIAS} = 10k ohms (MAX2632/MAX2633)
- TA = +25°C, unless otherwise noted

For more information see the part data sheet.

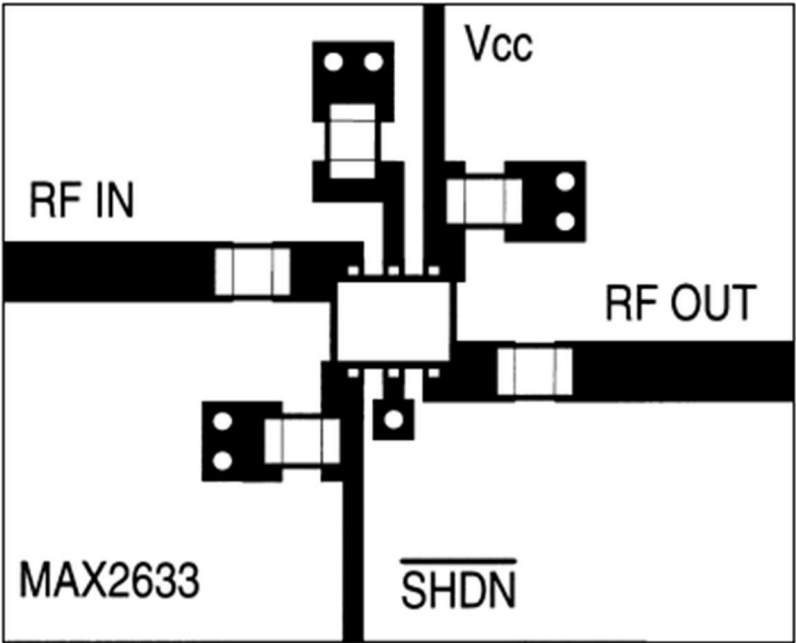


Figure 5: Circuit board layout.

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2005 Symposium papers
2007 Symposium papers

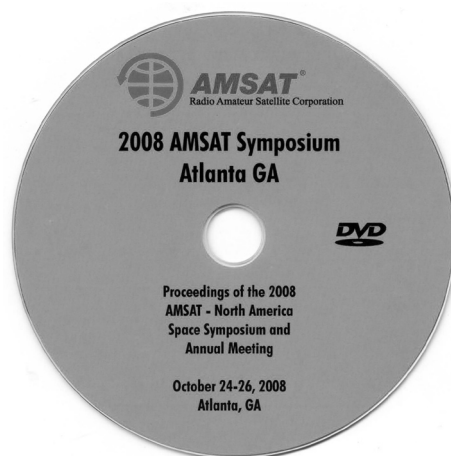




Photo 1: At the Williams, AZ hamfest 18-19 July 2008. Ray, W1OTH, a ham (and AMSAT member) from Prescott AZ, was talking to a visitor to the AMSAT table.

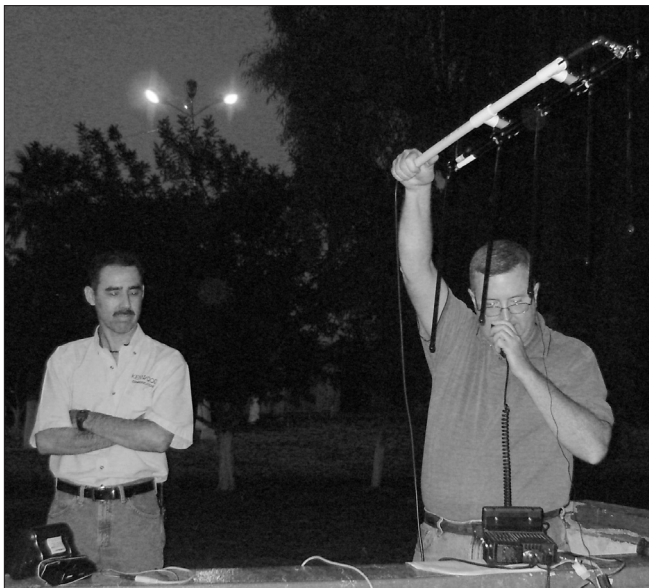


Photo 3: WD9EWK working an AO-51 pass from the Baja, California state capital on 19 February 2009. Carlos, XE2CLC is watching.

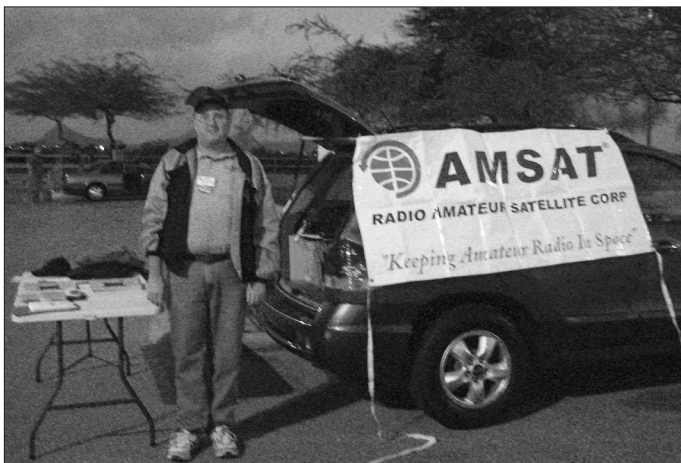


Photo 5: Patrick at the Radio Society of Tucson's Desert-Fest '09 hamfest in Tucson, AZ on 4 April 2009.

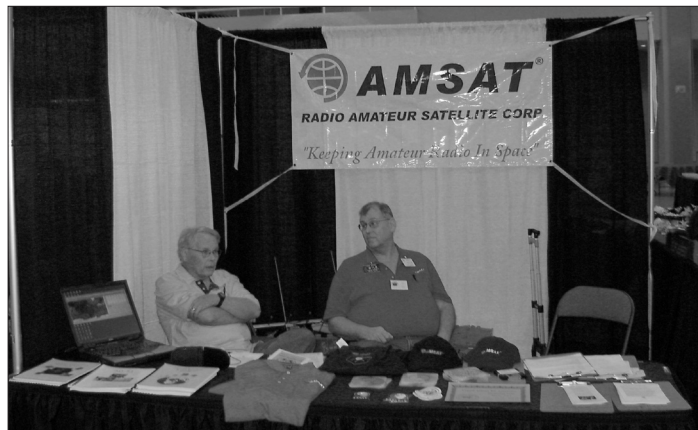


Photo 2: At the ARRL Southwestern Division convention in Mesa, AZ. Ray, W1OTH, (left) and Larry, W7LB, were at the AMSAT booth. This was a 3-day convention and the AMSAT table was a popular stop in the exhibit hall.

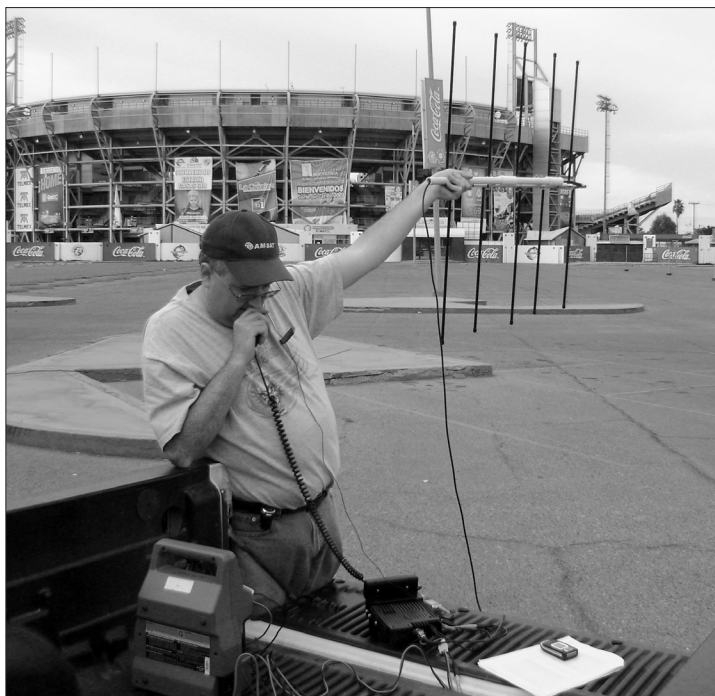


Photo 4: This photo was taken during Patrick's last trip across the border to Mexicali, the day after the Yuma, AZ hamfest wrapped up. Patrick was operating out of the back of a ham friend's pickup at Mexicali's "Ciudad Deportiva" (Sports City) complex east of the downtown area and near the USA border.



presenters as well. We had over 180 people at the Forum.

Many thanks to the many volunteers who supported AMSAT's efforts at Hamvention. In particular, we are all grateful for the stellar work that Gould Smith, WA4SXM, did to organize and implement AMSAT's presence at Dayton. Gould and Martha Saragovitz were the 'dynamic duo' for organizing AMSAT for Dayton. Gould not only handled the logistics, but managed the setup and take-down process, scheduled the booth volunteers, coordinated with TAPR regarding the joint banquet and publicized our activities. In addition, he also updated the "Getting Started with Amateur Satellites" for 2009, plus he was heavily involved with the SuitSat-2 Project to get things ready for the demo at Dayton. Without Gould's leadership, energy and dedication, AMSAT would not have enjoyed as successful a weekend at Hamvention. Thank you, Gould!

DARA Support for AMSAT

The overall financial condition of Hamvention over the past several years has allowed the Dayton Amateur Radio Association (DARA) to make donations to Amateur Radio organizations. For the third year in a row DARA presented a check to AMSAT during Hamvention. Their \$5,000 donation was presented by DARA President Steve Coy, K8UD, and was certainly an unexpected highlight at the AMSAT Forum, where not only Steve was present but also their entire board of directors was in attendance for the presentation. DARA's strong desire to support Amateur Radio is to be commended. Their willingness to make a contribution to help keep Amateur Radio in space is deeply appreciated.

ITAR Update

AMSAT is subject to ITAR (International Traffic in Arms Regulations) because satellites and associated systems are included in the list of items subject to these regulations. In my previous Apogee View column (*The AMSAT Journal*, March/April 2009, p.3) I reported that AMSAT on 13 March 09 had submitted a 'Voluntary Disclosure' report to the Directorate of the Defense Trade Controls Compliance, Enforcement Division of the US Department of State relating to our past involvement with AMSAT-DL's Phase 3-E project. This report centered on activities pertaining to the development of the IHU-3, SDX Transponder, and the CAN-Do! Bus modules. In response to that submission, AMSAT received a letter from the State

Department on 3 April 09 informing us that ITAR violations did occur. However, the letter also stated that the department was closing our case without taking action to impose a civil penalty. We were advised to continue our oversight and attention "to prevent similar incidents from occurring in the future."

This is good news! It eliminates the burden of uncertainty as to whether our organization or volunteers could potentially be prosecuted for past actions. As long as AMSAT continues to abide by current State Department rules, our volunteers have been given a 'pass.' It also allows AMSAT to formally file for export licenses for upcoming projects, such as the shipment of SuitSat-2 to Russia for eventual placement on the International Space Station.

In our disclosure statement, we had identified a number of AMSAT actions that might be potential ITAR violations. However, the response from the State Department does not specifically report which actions were indeed violations. This leaves AMSAT in a 'freeze' since we're not sure which of the actions we took were actually violations and what activity can resume without first obtaining a State Department license for the activity. We do not plan to resume any of our past activities with AMSAT-DL and AMSAT-UK (or other non-US organizations) until AMSAT receives some clarification on this. Consequently, we have requested an opportunity to meet with the appropriate compliance officials in the State Department to discuss our activities and to seek clarification as which technical data, software or parts do in fact need to be licensed under ITAR. We are also anxious to have a discussion with State about the

possibilities of securing a "commodity jurisdiction" decision that some or most of our technical data, which is basically "open source," can be excluded from ITAR licensing requirements, such as for the system development that we were sharing with AMSAT-DL (for example, the IHU-3). If that isn't feasible, then we'd like a better understanding of what might be needed in a Technical Assistance Agreement (a form of license allowing transfer of technology to foreign persons identified in the license) intended to cover an all-volunteer, not-for-profit organization such as AMSAT.

Our goal is to be able to re-establish working relationships with AMSAT-DL and AMSAT-UK. Given our past relationships with these two organizations and the benefits of working together on Amateur Radio satellite projects, AMSAT must find a way to work within the ITAR framework and be able to expand the presence of Amateur Radio in space by sharing knowledge and development work with our counterparts.

It is worth noting that there is an effort now underway in Congress to remove some commercial satellite technology generally from the jurisdiction of the State Department and have it regulated by the Department of Commerce, which has license exemptions that would benefit AMSAT. See *The New York Times*, April 2, 2009, p. A16. There is no assurance this effort will be successful in the near term, or at all. Therefore, we are taking measures noted above to assure compliance with ITAR now so that AMSAT can resume work with our counterpart organizations overseas.

73,

Barry, WD4ASW

AMSAT President ☺

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AMSAT at Hamvention 2009 by Gould Smith, WA4SXM, wa4sxm@amsat.org

We didn't know what to expect at Dayton this year to celebrate AMSAT's 40th anniversary. With the bad economy, job losses and people generally being more frugal, our expectations were reserved. We were pleasantly surprised at the turnout and at all the attention the booth drew. Even though we did bring in about \$6000 less than last year, we had great traffic at the booth. We got to talk with members, show memorabilia covering 40 years of keeping Amateur Radio in space, have a wonderful time with Owen and Richard Garriott and demonstrate the

The booth was designed as two areas, one for our standard publications, apparel, software, hardware, membership renewal and trinkets, while the other area was set up for engineering. The engineering area housed the 40th anniversary display and the SuitSat-2 display.

New Items at Dayton 2009

- Navy blue 40th anniversary AMSAT logo golf shirt and blue baseball cap and a black T-shirt with special 40th AMSAT logo by Steve Kenwolf,
- New DVD of the AMSAT 2008

- Elk antenna featuring a single plane design with no duplexer needed, as well as a carry bag for the antenna
- New AMSAT lapel pin

We also offered a revised "2009 Getting Started with Amateur Satellites" book and an updated "2009 Amateur Satellite Frequency Guide" (laminated).

AMSAT 40th Anniversary Display

We had a large display of memorabilia to highlight some of the accomplishments of AMSAT over the last four decades. These displays had various AMSAT publications, pins and patches as well as satellite prototypes for AO-5, AO-B and AO-7. The featured display showcased amateur satellite related covers from the major ham radio magazines such as *QST*, *CQ VHF* and *73*.

SuitSat Display

The AMSAT Engineering SuitSat-2 team had an operational SuitSat-2 system on display.

This is the entire system except for the solar panels, Russian supplied battery and Russian experiment. We were able to demonstrate the safety switches timing, video, TX, FM signals, CW signals and BPSK signals. The RX wasn't ready to demo the transponder, but will be available soon. There also was an experiment demonstration using the format that will be flown. We also assembled three receivers to receive the transmissions, demodulate them and display the data/audio. We also had a projector running a slideshow of AMSAT photographs since 1969.

Thursday Night at Tickets

Ed Collins, N9NUY, arranged for a new venue for our Thursday night get together. Tickets Pub and Eatery in Fairborn set



Figure 1: Start with a blank canvas, a plan and great volunteers.

SuitSat-2 system.

We had more volunteers to help set up the AMSAT booth than in recent memory. Chuck Pinkum, K3PER, began the effort on Wednesday afternoon by renting a van and picking up a van load of boxes we had mailed to Steve Coy, K8UD, and Nancy Makley, KC8GYW. On Thursday morning my group picked up another rental van to get the booth materials out of storage while another group headed for Hara Arena. We got the vans unloaded and most of the team went to lunch while a few souls stayed and worked on the booth. After lunch the assembly process began in earnest and the booth quickly began to take shape.

Setup Crew:

Gould, WA4SXM; Barry, WD4ASW; Steve N9IP; Alan WA4SCA; Dee NB2F; Chuck, K3PER; Keith, W5IU; Roger, WA9PZL; Drew, KO4MA; Mark, N8MH; Wilse, WX7P; Rick, W2GPS; Dave, W8AAS; Mike, WB8CXO; Brian, K3PU and Glynn, KE4IS.

Symposium papers, with PowerPoint presentations, audio and additional material. This disk also has the materials from the Proceedings. **A great disk.**

- Limited number of complete LVB Tracker box kits in enclosures, enclosures only and LVB Tracker boards. Information can be found at LVBTracker.com.



Figure 2: General purpose area of the AMSAT Booth.



Figure 3: AMSAT golf shirt and hat logo.

aside a room just for us and we filled it. The camaraderie, food, drink and service were excellent. Tickets has a Greek menu along with standard American fare that was enjoyed by all attending. We will be going back there next year.

Friday Activities

Satellite demonstrations began before the doors opened on Friday and went on throughout most of the day. Drew Glasbrenner, KO4MA, Keith Pugh, W5IU, Mark Hammond, N8MH, and other volunteers conducted satellite demonstrations just outside the Ball Arena entrance Friday, Saturday and Sunday. This year we had both a computer controlled desktop station



Figure 4: AMSAT 40th Anniversary T-shirt.

as well as a manual station working the satellite passes.

We learned overnight that three AMSAT members were among the 2009 inductees into the CQ Magazine Hall of Fame.

- **Frank Bauer, KA3HDO** – NASA Chief Engineer for Exploration Systems; International Chairman, Amateur Radio on the International Space Station (ARISS), 1996-2009; AMSAT VP Human Spaceflight, 1991-2009.
- **Wilse Morgan, WX7P** – Conducted first Amateur Radio license exam session under the Volunteer Examiner program in 1984; helped get VE program approved; also designed innovative antennas.

- **Ron Parise, WA4SIR (SK)** – Astronaut and active ham in space. First ham to operate packet radio from space and pioneered the “telebridge” concept for making more frequent school-shuttle contacts possible. Also helped develop Radio JOVE, an educational program for monitoring natural radio signals from Jupiter.

We ran out of assembled LVB Trackers Friday morning, so Mike Young, WB8CXO, went back to the hotel and spent Friday afternoon into Saturday morning building additional trackers, missing the Banquet. Thumbs up to you Mike.

I would like to thank all the volunteers that manned the booth over the two and a half days of Hamvention. We could not have done it without such a dedicated group. I always look forward to working with the team, most of which are multi-year veterans. I think the volunteers also find it a rewarding experience talking about our amateur satellite hobby to prospective operators; I know I do.

2009 Booth Volunteers

Don Agro, VE3VRW; Barry Baines, WD4ASW; Steve Belter, N9IP; Frank Bauer KA3HDO; Bill Bordy, NJ1H; Robert Felt, KB5YZG; John Germanos, WB9PNU; Drew Glasbrenner, KO4MA; Jeff Griffin, KB2M; Robin Haighton, VE3FRH; Rick Hambly, W2GPS; Mark Hammond, N8MH; Dee Interdonato, NB2F; Jim Johns, KA0IQT; Dave Jordan, AA4KN; Roger Ley, WA9PZL; Andy MacAllister, W5ACM; Will Marchant, KC6ROL; Lou McFadin, W5DID; Wilse Morgan, WX7P; Chuck Pinkum, K3PER; Keith Pugh, W5IU; Douglas Quagliana, KA2UPW; Bill Reed, NX5R; John Shew, N4QQ; Gould Smith, WA4SXM; Dave Taylor, W8AAS; Bill Tynan, W3XO; Mike Young, WB8CXO; Martha Saragovitz.

Richard and Owen Garriott

Richard Garriott, W5KWQ, (acquired his grandfather's callsign) was scheduled to meet people and sign autographs at the booth this afternoon. We were very excited and pleased to learn that Owen Garriott, W5LFL, would join his son Richard at the AMSAT booth. Owen is a NASA astronaut and



Figure 5: Amateur satellite magazine covers.

carried the first ham radio to orbit on his second flight in 1983 aboard the 9th shuttle flight. Owen was also a Skylab 3 astronaut. They arrived Friday afternoon at the booth and we got to meet and talk with these two accomplished and gracious men. This was the first time that they had appeared together to sign autographs. Richard also made a number of hams very happy by personally delivering a QSL card to those people present that he had talked with while on the ISS. Richard also had his notebook from the flight and many hams got to see his actual entry of their callsign in his log. It was also gratifying to see Richard easily making an extra effort to talk with each child that was in line. Many thanks to Frank Bauer for supplying the great 8x10 photographs upon two occasions of Richard and Owen with the Saturn rocket in the background.

AMSAT/TAPR Banquet

Friday evening was the sold out annual AMSAT/TAPR banquet at the Kohler Presidential Banquet Center. The buffet line opened on time, we ate and settled in to listen



Figure 6: AO-5, AO-B and AO-7 prototypes with a couple of USNA CubeSats.



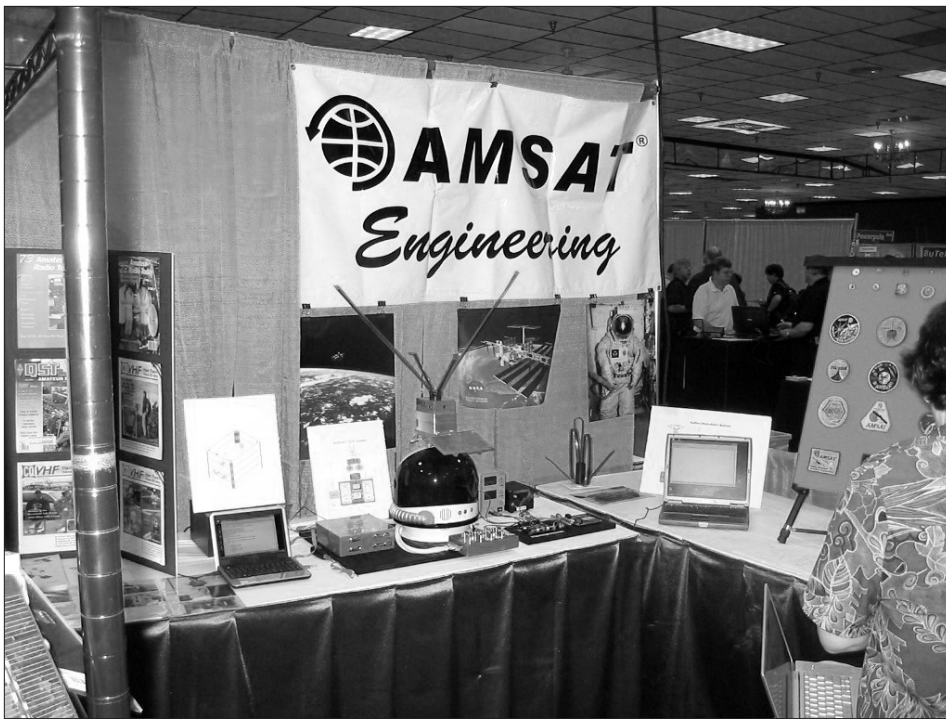


Figure 7: AMSAT engineering area.

to our featured speaker - **Richard Garriott, W5WKQ**. Richard had just returned from the ISS and is a noted video game developer, entrepreneur, adventurer and as we learned a storyteller. Richard told us about how he helped organize the private trips to space and was scheduled to be the first private citizen to go into space. He was unable to make that trip, but stuck to his goal and made it happen. We learned about the nine month flight training, his impressions from space and his ham radio activities. Richard is a very interesting man and many of his adventures have lead to his founding a new organization to fill a need. This was an excellent talk that was enjoyed by all present.

Another highlight to the evening was DARA President Steve Coy, K8UD, presenting AMSAT with a generous donation from DARA.

Saturday Activities

AMSAT Forum

The AMSAT forum was held on Saturday morning May 17, 1115 -1330 in Forum Room 5, close to the AMSAT booth. The room was full and a great deal of information about AMSAT programs was presented. **Rick Hambly, W2GPS**, AMSAT past president and current board member moderated the forum.

Richard Garriott, W5WKQ, gave a brief description about his time aboard the ISS in October, 2008. Richard Garriott became the first second generation American in

space. Richard performed many experiments and activities on orbit, but noted that his ham radio activities were by far the most fulfilling. In his 10 days aboard the ISS Richard completed over 500 QSO's, sent hundreds of SSTV images and spoke with

dozens of school children globally.

Barry Baines, WD4ASW, AMSAT President, "AMSAT Status Report: What is happening with AMSAT?"

Barry discussed current activities within AMSAT some of the challenges facing the organization.

Gould Smith, WA4SXM, AMSAT VP-Member & User Services and SuitSat-2 Systems Engineer "SuitSat-2 Status Report". Gould provided an overview of AMSAT's current engineering project which is projected to be shipped to Russia this fall for a late 2009 trip to the International Space Station and subsequent release into space in 2010. SuitSat-2 will feature a number of operating modes and is designed to be a test bed for new technology that AMSAT expects to be utilizing in future satellites.

Drew Glasbrener, KO4MA, AMSAT VP-Operations, "AMSAT Satellite Operations Update" provided an overview of current satellite operations as well as discussed future satellite opportunities currently under consideration.

Will Marchant, KC6ROL, AMSAT VP-Human Space Flight "A Ham Radio Operator's View of ARISS". Will outlined several new initiatives under development



Figure 8: Keith, W5IU, working a satellite pass at Dayton 2009.

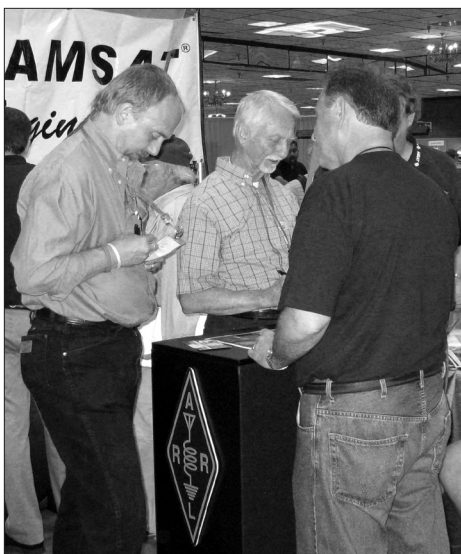


Figure 9: Richard, W5KWQ, (l) Owen, W5LFL, with Mark, N8MH. Mark is receiving a QSL card from Richard confirming their QSO while Richard was aboard the ISS.

for Amateur Radio on the International Space Station (ARISS) that are of interest to Amateur Radio operators.

Lou McFadin, W5DID, ARISS Hardware Manager “Antennas for the Columbus Module” Lou discussed the latest piece of Amateur Radio equipment to be shipped to the European Space Agency for deployment to the ISS and explained the significance of this development.

One of our multi-talented volunteers, Steve Belter, N9IP, videotaped Richard’s Banquet talk and the forum presentations. His edited work on these should be available via streaming video from the AMSAT Web site by the time you read this. We will announce the URL via the Web site and ANS.

There was a surprise for Frank Bauer, KA3HDO, at the ARRL forum featuring Richard Garriott on Saturday afternoon. ARRL President Joel Harrison, W5KWQ, presented Frank with the ARRL President’s Award. This award is rarely given and only to those who “have shown long-term dedication to the goals and objectives of ARRL and Amateur Radio” and who have gone the extra mile to support individual League programs and goals. Frank stepped down from his role as ARISS International Chairman and ARISS Program Leader this spring. Since 1991, he also served as the Radio Amateur Satellite Corporation’s (AMSAT) Vice President for Human Spaceflight Programs.

Richard and Owen Garriott both visited the AMSAT booth again on Saturday afternoon



Figure 10: Richard Garriott speaking at the 2009 AMSAT/TAPR banquet.

to greet visitors and sign autographs. Many thanks to Frank Bauer, KA3HDO, and Rosalie White, K1STO, for managing Richard and Owen’s schedule and we were instrumental in getting them to Dayton. Richard was also in Dayton to receive the 2009 Special Achievement Award from the Dayton Hamvention at a Saturday night Banquet.

Sunday was a short day with satellite demonstrations and SuitSat demonstrations and tweaks to the receiving system. The booth takedown took a little longer than usual with the extra SuitSat demonstration equipment to pack. Just to let you know that your officers and board members do

more than meet, half the crew that took the booth materials to storage were current or former AMSAT Presidents (Barry Baines and Bill Tynan). Alan Biddle and I finished out the crew.

It was a great Hamvention for AMSAT. We met with hundreds of members, had a wonderful experience with the Garriotts, demonstrated SuitSat-2 hardware and started our 41st year as an organization. Many thanks to the 30+ volunteers who made the AMSAT presence at Dayton a great success. 📶



Figure 11: Another memorable visit to the AMSAT booth by Richard and Owen Garriott shown here with Gould Smith (r).



Reach for the stars.

N3UC, formerly N4USI, control operator of AO-27, says, "AO-27 may be getting old and failing at times, after 15 years circling the earth. But, my IC-910H that I use to control AO-27, using data transmissions, has never failed me".

Icom 910H The perfect satellite rig.



Have fun communicating with these satellites using the IC-910H:

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In the near future, check out these satellites:

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